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Marie Skłodowska-Curie Actions

Research and Innovation Staff Exchange (RISE)
Call: H2020-MSCA-RISE-2014

PART B

"E-JADE"

Europe-Japan Accelerator Development Exchange Programme

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LIST OF PARTICIPANTS

Table B1. Participants table

Participant number *(as table §A.2)*	Partnership Member	Legal Entity Short Name	Academic (Y/N)	Country
	Beneficiaries			
1	European Organisation for Nuclear research	CERN	Y	CH
2	Commissariat à l'énergie atomique et aux énergies alternatives	CEA	Y	FR
3	Centre National de Recherche Scientifique	CNRS	Y	FR
4	Agencia Estatal Consejo Superior de Investigaciones Cientificas (CSIC)	CSIC	Y	SP
5	Deutsches Elektronen-Synchrotron	DESY	Y	DE
6	Royal Holloway, University of London	RHUL	Y	UK
7	University of Oxford	UOXF	Y	UK
	Partner Organisations			
8	High Energy Accelerator Research Organisation	KEK	Y	JP
9	University of Tokyo	UoT	Y	JP

Table B2. Data for non-academic beneficiaries

Name	Location of research premises (city / country)	Type of R&I activities	No. of full - time employees	No. of employees in R&I	Web site	Annual turnover (approx., in Euro)

List of abbreviations

ATF	Accelerator Test Facility
CEA	Commissariat à l'énergie atomique et aux énergies alternatives
CERN	European Organisation for Nuclear research
CLIC	Compact Linear Collider
CNRS	Centre National de Recherche Scientifique, France
CSIC	Agencia Estatal Consejo Superior de Investigaciones Cientificas, Spain
DESY	Deutsches Elektronen-Synchrotron, Germany
EDMS	Electronic Document Management System
FCC	Future Circular Collider
FEL	Free Electron Laser
HL-LHC	High Luminosity LHC (upgrade project)
HTS	High Temperature Superconductors
ILC	International Linear Collider
J-PARC	Japan Proton Accelerator Research Complex
KEK	High Energy Accelerator Research Organisation, Japan
LAL	Laboratoire de l'Accélérateur Linéaire, France
LAPP	Laboratoire d'Annecy-le-vieux de Physique des Particules, France
LC	Linear Collider
LHC	Large Hadron collider
LIU	LHC Injectors Upgrade
RF	Radio Frequency
RHUL	Royal Holloway, University of London
SRF	Superconducting Radio Frequency
TeV	Tera Electron Volt
UoT	University of Tokyo
UOXF	University of Oxford

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1. Summary

The Europe-Japan Accelerator Development Exchange Programme (E-JADE) addresses the urgent need of exchange of ideas on R&D and implementation of future accelerators for particle physics. It does so by exchanging accelerator scientists and experts between Europe and Japan.
The recent European Strategy for Particle Physics and the Japanese Roadmap identify similar pressing goals of research for the next decades. The strategy emphasises the exploitation of the Large Hadron Collider (LHC) and its upgrades, preparation of the cases for new facilities at the energy frontier (FCC or CLIC), identifies the opportunities for electron positron collisions (ILC), particularly after the recent discovery of the Higgs boson, and recognises the need for a long baseline neutrino programme at J-PARC in addition to the BELLE II programme of KEK.
The user community at these facilities is international: a strong contingent of Japanese researchers from KEK and universities work on the ATLAS experiment, highly qualified experts from KEK contribute to the LHC itself, some two thousand researchers worldwide have signed the ILC design report and several hundred physicists are actively engaged in accelerator studies, such as on ATF to explore concepts generally applicable to linear colliders. The J-PARC neutrino experiment, with a strong European participation, has recently published important scientific results.
The planned exchange of staff of leading European Laboratories and Universities with two prominent Japanese partners, KEK and University of Tokyo will focus on the most critical subjects and profiles namely on the design, R&D and prototyping of the future accelerator facilities mentioned above. Key objectives beyond technical progress are related to sharing of technical knowledge, project organisation, treatment of multiple safety codes for technical equipment, purchase methodologies and industrial capabilities, innovation and networks to significantly advance these projects.

2. Excellence

Background

Accelerators are the primary scientific instruments for research in experimental particle physics. From its birth a century ago accelerator science quickly became a global enterprise, with groups of experts working in large national or international laboratories exchanging their experiences and expertise. With the increasing size of these facilities there is a pressing need for global strategic planning for collaboration in construction projects, as well as increased exchange of expertise in the preparatory stages of future accelerator projects. Collaboration between Europe and Japan is a vital base of these global endeavours.
The European Strategy for Particle physics was approved by the CERN Council in 2013, highlighting four future accelerator developments as main priorities. These are listed below.

In parallel the five-year research strategy for the Japanese national laboratory KEK, starting in the year 2014 involves several areas of overlap with the European Strategy. The overlaps are listed below (italic).

1. LHC and the LHC luminosity upgrade:

The discovery of the Higgs boson is the start of a major programme of work to measure this particle's properties with the highest possible precision for testing the validity of the Standard Model and to search for further new physics at the energy frontier. The LHC is in a unique position to pursue this programme. Europe's top priority should be the exploitation of the full potential of the LHC, including the high-luminosity upgrade of the machine and detectors with a view to collecting ten times more data than in the initial design, by around 2030. This upgrade programme will also provide further exciting opportunities for the study of flavour physics and the quark-gluon plasma.
*The main agenda "*i.e. programme for Japanese groups*" at LHC/ATLAS is to participate in the experiment and to take a proactive initiative in upgrade programs within the international collaboration at both the accelerator and detector facilities.*

2. Preparation for a post-LHC high-energy frontier facility in Europe
   To stay at the forefront of particle physics, Europe needs to be in a position to propose an ambitious post-LHC accelerator project at CERN by the time of the next Strategy update, when physics results from the LHC running at 14 TeV will be available. CERN should undertake design studies for accelerator projects in a global context, with emphasis on proton-proton and electron-positron high-energy frontier machines. These design studies should be coupled to a vigorous accelerator R&D programme, including high-field magnets and high-gradient accelerating structures, in collaboration with national institutes, laboratories and universities worldwide.
   Post-LHC accelerator projects in Europe are not directly on the KEK roadmap, but there are key R&D and test-facilities in Japan that are being mentioned in the roadmap, that are highly relevant for these programmes:
   Development of accelerator science and future R&D are highlighted in the KEK roadmap. Among these with high relevance to the European programmes are high–field magnet studies, high-gradient structure studies and testing, and operation of the ATF as worldwide leading facility for studies of low-emittance beams and final focus.

3. International Linear Collider (ILC)
   There is a strong scientific case for an electron-positron collider, complementary to the LHC, that can study the properties of the Higgs boson and other particles with unprecedented precision and whose energy can be upgraded. The Technical Design Report of the International Linear Collider (ILC) has been completed, with large European participation. The initiative from the Japanese particle physics community to host the ILC in Japan is most welcome, and European groups are eager to participate. Europe looks forward to a proposal from Japan to discuss a possible participation.
   KEK will play a central role in creating an international preparatory group and will lead the effort on advanced R&D, the engineering design of the apparatus and facility, and the organizational design toward ground-breaking for the linear collider project to be hosted in Japan, within the framework of a global collaboration.

4. Neutrino programmes
   Rapid progress in neutrino oscillation physics, with significant European involvement, has established a strong scientific case for a long-baseline neutrino programme exploring CP violation and the mass hierarchy in the neutrino sector. CERN should develop a neutrino programme to pave the way for a substantial European role in future long-baseline experiments. Europe should explore the possibility of major participation in leading long-baseline neutrino projects in the US and Japan.
   At Japan Proton Accelerator Research Complex (J-PARC) a significant improvement in the measurement precision of the T2K experiment will be pursued. In addition, new research plans will be developed for the next generation of long-baseline neutrino oscillation experiments, while relevant preparatory studies are pushed forward in

parallel. Regarding the program for improving J-PARC's accelerator systems, a high-priority item is to rapidly meet the design beam intensity goal, to be supplemented soon thereafter with preparation for the next-stage upgrade plans for the facility, which will enable a major increase in the beam intensity.

2018 is the horizon timescale of both strategies, and we can identify clear goals for significant collaborative efforts in this period. In Europe the basis of the next strategy update will be strongly interconnected with the development of the Japanese particle physics accelerator programme. It is therefore essential to strengthen our contacts and establish common goals, starting now.
The aim of E-JADE is therefore **"Mutual reinforcement of future accelerator programmes in Europe and Japan, covering technical, institutional/organisational and individual/personal development and exchanges"**.

This overall aim can be broken down into scientific/technical progress, institutional and strategic goals, and personnel development and training:

1) **Optimisation of common efforts to boost future accelerator projects that are part of the Europe and Japan roadmaps by the following means:**
   - Exchange expertise in key technical and organisational areas;
   - Enhance communication and common efforts on developing high-priority projects;
   - Increase information flow, logistics and knowledge exchange among their partners.
2) **Identification of collaboration potential and optimisation of project planning:**
   - Identify skills, expertise, and technologies for application in project development;
   - Improve efficiency of resource usage, including personnel and expertise;
   - Share and develop experience on global partnerships for realising frontier projects.
3) **"Familiarisation"**, including:
   - The scientific, industrial and academic landscapes;
   - Working philosophy and methodology;
   - Culture and languages;
   - Personnel contacts.

The E-JADE participants are renowned laboratories in Europe and Japan that lead in advanced projects on accelerators for particle physics. They have a clear goal of engaging in novel and improved pursuit of these projects. **We propose to expand our collaborative efforts in the areas outlined below by adding significant staff exchanges in order to move from a model of separately coordinated efforts in the two regions, to integrated knowledge transfer and joint project development.** This is only possible with a significantly increased presence of staff from one region at the premises of the other region.

2.1. Quality, innovative aspects and credibility of the research (including inter/multidisciplinary aspects)

We have identified three crucial technical/scientific co-operation areas where the strategic overlap between Europe and Japan is of highest priority for both, and where increased collaboration, exchange of experience and skills, as well as further strengthening of R&D and coordination efforts would have profound benefits for realising excellent accelerator-based science:

1) Hadron collider R&D, including injector systems, and high intensity proton drivers for long baseline neutrino projects (points 1, 2 and 4 of the European Strategy).
2) Implementation of LC technologies, with an emphasis on ILC, and including R&D for high gradient future colliders such as CLIC (points 2 and 3 of the European Strategy).
3) Operation and enhancement of the ATF at KEK, a key test facility for producing and manipulating low-emittance beams with a unique final focus system. This is essential for demonstrating the luminosity performance of future linear colliders. Several European laboratories make vital contributions to ATF, thereby addressing performance challenges for ILC and CLIC (Points 2 and 3 of the European Strategy).

These efforts form the basis of three inter-related science and technology work packages (described below). Additional work packages on Management and Dissemination, Training and Knowledge Transfer will ensure that the overall aims are fully addressed. The work packages are described below.

Table B3: Work Package List

Work Package No	Work Package Title	Activity Type (e.g. Research, Training, Management, Communication, Dissemination…)	Number of person-months involved	Start Month	End month
1	LHC consolidation, upgrades and R&D for future hadron machines	Research	78	1	48
2	Nanometre scale beam handling at the ATF	Research	178	1	48
3	Linear Collider targeted R&D	Research	163	1	48
4	Management and Dissemination	Management and Dissemination	99	1	48
5	Training and Knowledge Transfer	Training	22	1	48

2.1.1. Specific objectives and the relevance of the research and innovation project to the scope of the call and in relation to the "state of art".

The state-of-the-art in relation to the goals of E-JADE is shown in the table below.

Project	State of Art	E-JADE goals with emphasis on the collaborative Europe-Japan effort
LHC and HL-LHC	LHC will resume data-taking in 2015 at near full design energy. Japanese researchers are	Establish physics motivation for future high energy accelerators

	involved in this programme. The HL-LHC programme will start its construction phase aiming for completion in 2022-24. Japanese contributions are anticipated in the area of the separation dipoles The LHC injector upgrade project receives Japanese contributions in the area of magnetic alloy RF systems and control systems	Move from R&D into construction and by 2018 develop the Japanese contribution to the project from planning to execution Complete the LHC injector upgrade project in time for the HL-LHC upgrade
CLIC and FCC	R&D projects preparing plans, costing and implementation, scheduled to report by 2018. Industrialisation studies for main components.	Complete FCC Conceptual Design Report around 2018, including Japanese contributions in high-field magnets and high-gradient structures. An optimised CLIC implementation plan is foreseen at the same timescale. Other key goals relate to LC general performance tests in ATF with high relevance for CLIC and injector studies for FCC linking to the LIU programme.
ILC	TDR completed in 2013. Now proceeding with site-specific implementation. Japanese studies of implications of hosting ILC. Negotiations have started on potential international contributions. An international preparation team is being set up with European participation. Aiming for a construction decision around 2015/16.	Complete preparation phase with site-specific design by 2016, followed by preparation for construction. The potential European contribution needs to be defined on the same timescale and capitalising on European technological, industrial, and skills capabilities.
Neutrino programme and J-PARC	The J-PARC improvement programme is aiming to achieve the design beam intensity goals, to be supplemented soon thereafter with preparation for a further intensity upgrade.	European contributions to the accelerator upgrade project are not yet defined, but the R&D and implementation work for the LHC injector upgrade project and proton drivers in general at CERN is highly relevant and will be explored.

2.1.2. Methodological approach highlighting the types of research and innovation activities proposed and their originality.

The work proposed in E-JADE covers development of equipment for new accelerators, R&D and project development and planning, operation and improvement of accelerator test-facilities as well as dissemination and training.

WP1 covers the LHC exploitation and upgrades in particular linking to the planned Japanese contributions to these projects, as well as R&D for future hadron machine at higher intensity or energy. LHC will run near its full energy from 2015 and Japanese researchers participate in operation, analysis and upgrade projects for both accelerator and detectors. R&D on high field magnets and wideband magnetic alloy RF systems carried out in Japan is a key ingredient for upgrading the LHC itself as well as its injectors - through the LHC Injectors Upgrade project - and for reaching the performance goals of the High Luminosity LHC (HL-LHC) project. This is also relevant for the J-PARC upgrades and, at a later stage, for a potential very large collider as studied in the Future Circular Collider (FCC) programme. The main objective for this work-package is integration of the European and Japanese efforts (involving also other regions) on the LHC High Luminosity upgrade into a construction project for the upgrade hardware.

WP2 covers the programme at the Accelerator Test Facility (ATF) at KEK operating an electron damping ring with ultra-low transverse emittance. ATF2 is a low energy scaled version of a future Linear Collider (ILC, CLIC) final focus beam line where the extracted ATF beam is used to test the sophisticated beam handling techniques planned at the collision point. The operation and R&D programme are managed by an international team involving all the E-JADE partners. Each technical task includes training and transfer of knowledge goals. The main objective of this work package is to demonstrate solutions and methods for final focus systems for future Linear Colliders so as to meet their performance goals.

WP3 is based on the ILC Technical Design Report and the chosen Japanese site, and addresses site-specific optimisation of the design and implementation. An international ILC preparation team is being set up, including key roles for around ten European accelerator scientists. Visits of these scientists to Japan will be mandatory. The main objective for this work-package is to develop the site-specific design for ILC in Japan, and a project implementation plan involving European participation at an appropriate level.

E-JADE provides, by extended secondment of accelerator science experts, a new integrated approach to fulfilling the common objectives for these projects. A similar approach has been used for large detector systems but this is a novel approach for accelerator projects. The secondments are planned year by year, and the main goals of the visits are linked to the milestones and deliverables of the work-packages. The preparation and documentation of the visits will be prepared, approved and stored in EDMS.

2.1.3. Inter/multidisciplinary types of knowledge involved

E-JADE encompasses accelerator projects in Europe and Japan, which address multiple physics goals. Accelerator science is very multidisciplinary, covering accelerator physics, electrical and mechanical engineering, RF systems and magnet technologies, super-conductivity and cryogenics, power systems and distribution, material science, detector and sensor systems, vacuum and cooling, alignment and stability, control and operation. Virtually every aspect of the accelerator will be developed within a framework of R&D and prototyping with industrial partners, integrating all these disciplines to yield optimal and cost-effective systems.

Given the size of modern accelerators other project aspects also need to be covered, for example civil engineering, transport, installation planning, scheduling and project

management and monitoring. Information systems and project dissemination are also areas where exchange of expertise and knowledge are highly relevant.

In E-JADE the intention is to cover all these disciplines via secondments. Although primarily linked to the technical/scientific aspects, specific secondments are planned in the areas of project management and information systems, as well as events linked to the accelerator industrial landscape in Europe and Japan. The latter will include exchanges of experience and procedures related to technology transfer and innovation methods, from scientists, through laboratories and universities, to industry and commercial partners.

From a European perspective specific technical expertise in Japan (high-field magnet technologies, crab cavities, etc.), the presence of and access to unique facilities (ATF and J-PARC, ILC planned), and the strong links between Japanese researchers and industry represent major reasons why exchanging personnel and expertise with Japan will add significant value European researchers.

2.2. Clarity and quality of knowledge sharing among the participants in light of the research and innovation objectives

The E-JADE project integrates three levels of inter-regional collaborative activities – technical/scientific, institutional/strategic, training/knowledge transfer. The three research work-packages (1-3) will be executed by integrating the researchers into the appropriate groups and sections at the respective host institute. As visiting scientist they will participate in the research activities of their host, and during the secondment execute the predefined programme for their visit. An integrated part of the individual secondment working plans are the management/dissemination and training/knowledge transfer activities foreseen for the person being seconded.

In general the main mode of knowledge sharing is implemented through joint research projects of seconded staff at the host institutions. In total, 367 man-months of staff will be seconded from seven European research institutes to the two Japanese institutes and 173 man-months of Japanese staff will be second to the European beneficiaries.

Essential to execution of the task of these work-packages is setting up dedicated offices at CERN and KEK for exchange of personnel and execution of the key tasks related to preparation of visits: housing, translation, dissemination, exchanges in the areas of management, purchasing, industrial interactions and innovation studies, and human resources. A vital component of the knowledge sharing process will therefore be CERN and KEK offices, which are part of the management/dissemination work-package and have the responsibility for preparing and aiding the seconded personnel in Europe and Japan.

A key feature of the participating laboratories and universities is that local training opportunities are very well developed. Such local training is available for Early Stage Researchers, Experienced Researchers and Technical Staff. The seconded personnel will be encouraged to participate in such training programmes, covering aspects ranging from technical/scientific project management tools and methods, and languages.

An example is the **CERN local training and development programme.** There are four types of courses: **Technical training:** Languages, management, communication and technological courses (more than 200) in small groups. Certification is given in some cases. **Academic training:** CERN-wide lectures in academic topics presented by international experts. **Summer student lectures:** Special academic training given on accelerators and detectors as well as particle physics delivered by CERN experts. **Graduate level schools:** in accelerators and computing for high energy physics, which allow in some cases to earn credits towards a PhD. Similar programmes exists for visitors at the other participating institutes.

In addition, knowledge sharing and training will take place both through local training events and workshops as well as through E-JADE-wide events. Dissemination of knowledge from the consortium towards the outside world is addressed in B3 Impact.

2.3. Quality of the interaction between the participating organisations

We propose several network activities for ensuring the coherence of E-JADE and the quality of knowledge transfer among the participations.

- An initial kick-off meeting is foreseen for E-JADE project participants focussing on the plans for the project execution.

- E-JADE meetings will be included in the annual workshops of the major projects (HL-LHC, Linear colliders, ATF).

- Each Beneficiary will organise a specialist Topical Workshop (TW), which will be open and advertised to a wide community, for the purpose of enabling knowledge transfer and exchange of ideas between Early Stage and Experienced Researchers from the Beneficiaries, Partner Organizations and other members of the global research community. The TW will provide an opportunity for assessment of scientific progress in the subject, discussion and development of strategy and future directions in the scientific area, and presentation of industrial applications. The TWs will be distributed across the four-year period.

- We plan to have an annual E-JADE meeting linked to the annual CERN-KEK meeting, to allow follow up and planning. This will allow annual reports across the work-packages and discussions with the CERN and KEK managements.

- We propose to organise two workshops aimed at dissemination, in particular focussing on links with industry. The first workshop will take place at KEK (2016) and the second at CERN (2018); each will last about three days.

    1. The **first E-JADE workshop** will be the occasion to present the first results and conclusions from each work package. For several of the projects important goals are due on this timescale. For ILC a site specific design and a formal statement about hosting the project can be expected. For the LHC luminosity upgrade projects construction planning will move rapidly ahead over the coming two years. LHC results at higher energy are also expected to become available 2015-16, which will motivate directions for future accelerator projects. The main focus will be interactions between accelerator developers and industry in each region, with

overview of the industrial capabilities, as well as technology transfer activities and innovation potential.

2. **The final E-JADE workshop in 2018** will take place at CERN. It will have similar scope as the first but will also attempt to take a more complete stock of the technical achievements of the E-JADE project, as well as interpret these results in the context of the European Strategy Update at around that time. Again there will be a strong focus on industrial developments and capabilities. The network of European Industry Liaison and Technology Transfer officers will be invited.

3. Impact

3.1. Enhancing research- and innovation-related human resources, skills, and working conditions to realise the potential of individuals and to provide new career perspectives

The E-JADE project will encourage the participation of researchers in global advanced research projects and hence provide long-lasting career perspectives. The unique nature of this project, underpinned by the strong international links between Europe and Japan, places the Early-Stage Researchers and Experienced Researchers in a privileged position to acquire new skills and to develop their career ambitions. They will also have the key advantage of having a substantial international network of colleagues and partners in their own field of research coming from both the EU and Japan. They will have experience of working on another continent and of having interactions with international research organizations. The researchers in the staff exchange programme will be exceptionally well equipped for future research and innovation projects in forefront accelerator technology. The researchers will be able to obtain a real “hands-on” experience and will push the boundaries of innovation in accelerator development. Researchers will be trained by world-renowned European and Japanese experts and obtain new skills in managing large international projects and in designing and engineering large-scale accelerator facilities.

Especially young researchers (ESRs) will benefit greatly from this experience. They will improve their language, cultural and social skills. They will significant expand their network and learn to work in an international environment which will improve their self-management and self-organisation skills. They will work in unique research facilities that will give them unique insight in the cooperation between research and industry in Japan. Japan has a tight integration between the researchers and industry. The local research staff is relatively limited and the industry is much more integrated into the laboratories than in Europe. This has advantages in terms of well-developed contacts between researchers and industry, but it also is a limitation in planning and preparation in new projects because the accelerator science community is limited. In Europe, the industry is essential in R&D and construction but development and construction contracts for studies and specific items are being prepared and followed up by laboratory staff. To perform research projects in Japan will not only improve the project management skills, but will also be a unique experience for European researchers that will lead to enhanced career perspectives in both science and industry.

The researchers will personally benefit from the newly acquired knowledge. Experienced researchers will bring their own expertise and will gain knowledge for higher academic qualifications regarding experience on accelerator technology. The seconded researchers from Europe will learn new skills and gain new knowledge from the Japanese partners KEK

and University of Tokyo related to the operation and delivery of sub-micron sized beams for the development of new accelerators. The researchers will benefit from the specific expertise that each research partner brings in, among others:

- Expertise in treating superconducting cavities to support high RF-fields;
- Experience from industrial production of high-performance cavities;
- High-field magnet development;
- High-intensity accelerator components;
- Experience with working accelerators;
- EDMS experience from the construction of large accelerators;
- Advanced beam instrumentation, feedback and control systems;
- Stabilisation of beams at the nanometre level;
- Beam dynamics and instrumentation;
- Beam studies, beam size and position measurements devices, emittance reconstruction and collimation.

Careers opportunities of the participating researchers will improve as the project progresses. Expertise in optimisation of complex accelerator systems is rare and much sought after in accelerator laboratories. With a unique portfolio of technical and transferable skills, the researchers trained by the network can expect to advance to leading positions in research, development, design, test, engineering, consultancy and management in fundamental or applied accelerators research, including light sources, medical and materials science research. The career opportunities are very good in accelerator research laboratories (physics, light-sources, neutron facilities) and universities focusing on accelerator physics, superconductivity, material science and nuclear medicine. High-level accelerator scientists with experience in operating accelerators in an international environment are extremely sought after, for laboratories, industries but also increasingly for academic positions. The researchers seconded within E-JADE will therefore have excellent prospects to secure jobs in this field. For experienced researchers, the projects will help their career opportunities in their research institutes. They will benefit from the international exposure and stimulation from working with other senior staff. This will help them to progress in their careers and gain additional responsibilities and visibility.

Participating in this staff exchange programme will also lead to career opportunities in industry, such as accelerator component suppliers, medical facilities (hospitals using accelerators) and companies specialized in instrumentation and control, cryogenics systems, precision mechanics and mechatronics. There are in Europe excellent employment opportunities for well-trained accelerator physicists in industrial companies providing components or instrumentation and control systems for accelerators. Companies such as IBA, COSYLAB, DANFYSIK, RI, Babcock Noell, Scandinova, Thales, VDL, Air Liquide and Linde will welcome these researchers into their business. Also start-up opportunities based on knowledge and skills from this exchange programme or from collaborations with partners in Europe and Japan are a possibility for the participating researchers.

3.2. To develop new and lasting research collaborations, to achieve transfer of knowledge between research institutions and to improve research and innovation potential at the European and global levels

3.2.1. Development of new and lasting research collaborations

The E-JADE project capitalises on one of the largest existing research infrastructures, the Large Hadron Collider, at CERN in Geneva. The LHC was approved in 1994 and is expected to operate, including the luminosity upgrade programme until 2030-35. Future projects being developed as part of E-JADE, in Europe or Japan, are of similarly long timescales and similar long-term collaborations can be foreseen. The project fosters the exchange of ideas and expertise between Japan and Europe from the initial R&D phase until end of operation.

The overall aim of the proposed staff exchange programme is to extend, enhance and strengthen established collaborations between the European and Japanese partners who have initiated the creation of a community-driven knowledge base for the development for future accelerators (including test-facilities). This staff exchange programme is hence a direct consequence of the European Strategy for Particle Physics and from the Japanese Strategy for High Energy Physics. It refers to vital components of the strategy elements and promises significant impact on them. A high priority for the staff exchange programme, both in the European and Japanese research landscape, is therefore ensured, and the interest of all participating partners to realise the potential of this E-JADE project to the full extent is guaranteed.

The European Research Area Vision 2020 states that the ERA "should provide a seamless area of freedom and opportunities for dialogue, exchange and interaction open to the world." European research institutions need to provide attractive working conditions for researchers from all parts of the world, in the framework of a single labour market that enables mobility between countries and sectors (Council of the EU, Brussels, December 2008). An outward-looking approach between the EU and Japan is sought in this project, based on mutual benefit to exchange information freely and openly. The underlying consortium of seven European and two Japanese partners offers researchers opportunities to exchange new skills and knowledge across continents through a joint research exchange programme, training courses, meetings, workshops and conferences. It enables free circulation of research staff, knowledge and technology, and it creates long-lasting collaborations which will benefit current and future researchers at the institutions involved.

With respect to Japan in particular, the EU-Japan cooperation stated that it has "a huge potential for finding solutions to meet societal challenges such as secure energy supply, sustainable development and rapidly ageing populations". The EU-Japan Summit from 2001 enshrined the importance of bilateral cooperation in science and technology as a way to increase industrial competitiveness and ensure sustainable social development. In March 2011, the Agreement between the European Union and the Government of Japan on cooperation in science and technology entered into force. The E-JADE exchange programme is especially designed to strengthen the S&T sector dialogue between Japan and Europe regarding the development of future accelerators. For this project, the expectation is that especially young researchers will be active in shaping this path for global collaboration. It will contribute directly to an improved joint planning of current and future research activities and to set science, technology and innovation as key drivers for economic competitiveness, growth and employment. By improving research contacts and research training, the

exchange programme will also encourage researchers to pursue careers in science in Europe. The involvement of KEK and the University of Tokyo means that talented young researchers from Japan will come into contact with leading European research institutions which may encourage them to pursue research careers in Europe. This aspect contributes to the EC's goal to make Europe more attractive for researchers from the rest of the world.

3.2.2. Self-sustainability of the partnership after the end of the project

The LHC-engagement extends well beyond the 2030s; so a long lasting collaboration is foreseen. The R&D for a future facility at CERN after LHC has an even longer perspective. Japan is the strongest and leading candidate to host the ILC and if deciding to do so construction is foreseen for the next 10-15 years. KEK has two major experimental test facilities required for a future linear collider; the Accelerator Test Facility (ATF) and the Superconducting Accelerator Test Facility (STF). Concerning ATF, the European partners are internationally leading in beam diagnostics design and operation. ATF has an extremely low-emittance beam, which is perfect for testing advanced instrumentation. The partnership is therefore expected continue after this project has ended in December 2018. The J-PARC long baseline programme also has as a minimum a decade long improvement and exploitation phase ahead.

The E-JADE project will generally create new, and reinforce existing, long-lasting collaborations between partners in Europe and Japan, possibly also in areas not foreseen today where accelerator expertise is needed and common efforts can open new possibilities.

3.2.3. Contribution of the project to the improvement of the research and innovation potential

Japanese engagement in international accelerator-based particle physics started in the 1970s with scientists from the University of Tokyo participating in the DESY e^+e^- collider programme. The presence of Japanese physicists in Europe has since successfully continued with significant engagements at LEP and LHC at CERN and PETRA and HERA at DESY. The E-JADE project aims at establishing a similar European engagement in Japan and hence challenges European researchers to acquaint themselves with the working environment in Japan. If constructed the ILC would represents a new dimension in the collaboration between Japan and the EU because for the first time, Japan will host a global project with Europe as a major stakeholder. The activities of the E-JADE project will allow researchers to act as true pioneers in this goal. This programme will also provide a skilled workforce to European industry with valuable experiences in Asia in general and in Japan in particular.

The activities will be particularly rewarding since the European-Japanese interaction on the experiments at ATF and the layout of ILC, which will necessarily entail understanding of the other culture and work methodologies. The LHC work may introduce European co-workers directly to Japanese companies engaging in e.g. the design of the required magnets. The contribution of Japanese laboratories to the LHC needs close interaction with experts from CERN and addresses the highest priority of the strategy, full exploitation of the LHC. The planned scientific programme at the Accelerator Test Facility (ATF) at KEK is driven by interest in accelerator research. The improvement of the J-PARC facility finds significant scientific interest in Europe and Japan.

The political decision for the ILC project is expected to converge over the course of this programme so that the start of the ILC construction could be envisaged by the end of the E-

JADE project. A staff exchange programme at this early stage of the ILC project helps to prepare the ground for a leading European engagement and to create a lasting basis for this large infrastructure, which - if realised - will have a life span of several decades with major European participation. Japanese officials have long recognised the scientific, educational and societal benefits of an international research institute, which become even more apparent when the conducted research is openly accessible and will open new possibilities for European researchers.

3.3. Effectiveness of the proposed measures for communication and results dissemination

3.3.1. Dissemination strategy to achieve the potential impact of the project

The results of this project will be disseminated to its stakeholders, being the scientific community, politicians and policymakers and the general public. Researchers in the staff exchange programme will inherently be the messengers for the global strategy of particle physics and the emerging new infrastructures. They will, at their level, become ambassadors of Europe and the European scientific community. The project will include a task on dissemination of project results, including outreach. This activity will be closely connected to the outreach activities of the LHC, which are well established both at CERN and elsewhere, and the outreach programme for the global Linear Collider Collaboration and its predecessor, the ILC Global Design Effort. There are already professional “communicators” for the LC activities in Japan, Europe and Americas.

The dissemination of results to governments, politicians and policymakers will be done via CERN Council report on the projects in which each Member State is represented. The results will also directly be communicated to high-ranking Japanese government officials. The E-JADE project will intensify the international links with the establishment of the CERN-KEK office, which will act as a bridge of communication. The programme intensifies the relations between the EU and Japan through personal acquaintances, work relations, shared experience and common achievements, and thus laying the foundations for the truly international challenges posed by the next-generation accelerator and experiments in high energy physics.

The results of the research will be presented at conferences and published in open-access journals. They will also be made available in the public domain via web sites and video casts as well as public lectures and magazines. The designs, operational knowledge and performance measurements will be disseminated to the wider scientific community via talks at appropriate meetings. The simulation codes for beam instrumentation will be disseminated via web-pages and open source code repositories. The results are therefore freely available to every interested party and are expected to have significant impact also in other, related fields of research, development and industry. For the industry, specific reports will be disseminated via the CERN Industry and Technical Transfer Officers. All results will be presented at (national and international) conferences, industry meetings and at presentations in laboratories and universities, such as:

- Annual meetings related to LHC including its luminosity upgrade programmes;
- The annual Linear Collider Workshop (global event);
- The regional Linear Collider workshops in Asia, Europe and the Americas;
- The Beam Instrumentation workshop;

- The ATF collaboration meetings;
- ICHEP and LeptonPhoton (major summer conferences in high energy physics);
- The International Particle Accelerator Conference (IPAC);
- Industry meetings and industrial exhibitions.

3.3.2. Communication strategy to engage the public

The current number of students enrolled in science is highly insufficient for covering the necessities of a healthy expanding European industry, while there are many opportunities and more skilled people are needed. The consortium has devised an effective programme of outreach activities targeting different layers of society. Besides communicating via websites, social media and articles in newspapers and popular science magazines, public evening lectures, guided tours and visitor programmes and open days for the public at all participating research institutes, the scientists will communicate their enthusiasm in science to high school and university students. Researchers – female researchers in particular – that are participating in the exchange programme will take part in school class and university visits to the laboratories where they are seconded. They will discuss with students on their future career perspectives and will become, in their turn, role models for the young students at a critical time in which they decide on their university orientation and specialisation respectively.

Besides the personal involvement of the researchers in outreach activities, the partners both in the EU and in Japan will work as a team to organize an exhibition towards the end of the E-JADE programme, with media invited, in which the results and experience from E-JADE will be presented.

Table B.3.3.2 Outreach activities organized by the network

Activities	Target group	Impact
The seconded researcher will be involved in school class and university visits to the laboratories where they are seconded	12-18 year old high school students, 18-25 year old students	Enhanced interest in science subjects on high schools and universities as well as interest in scientific careers and recognition of the international aspect/possibilities of science.
Guided tours, visitor programmes and science open days at all research institutes	Public at large	Inform the general public and motivate young adults on following a scientific career. Communicate on research benefits and justify tax expenses.
Articles in newspapers and/or popular science magazines	Public at large	Information on real-life implications of key E-JADE innovations to targeted industrial audiences and the public at large; showcasing good use of taxpayers' money.
Multimedia/New Media updates (internet, social media) on E-JADE	Public at large, Young Internet users	Increased interest in science among the European policy; enhanced in scientific careers. Each seconded researcher will be interviewed about their experience.
E-JADE public exhibition	Public at large	Presentation of the results and experiences from the E-JADE programme

The organization of these outreach activities will be the responsibility of the task on outreach and dissemination and also responsible of the coordination with outreach activities organised by the Japanese partners.

3.3.3. Expected impact

The E-JADE project aims to support the exchange of key staff members in leading European laboratories and universities with the two largest Japanese partners in this field of high-energy physics and accelerator science, KEK and the University of Tokyo.

The joint research and innovation project between the European and Japanese partners will result in the optimisation of the common effort to advance future accelerator projects. The results are essential in developing the key accelerator project currently pursued by CERN and crucial contributions from Japan are identified in certain technical areas (high-field magnets, RF systems, beam delivery system studies for linear colliders). Furthermore, the project will give the seconded staff a more and better overview of the Japanese accelerator activities and capacities, including the industrial sector. This will open opportunities for an increased collaboration and participation in the future. It will exchange expertise for key technical and organisational areas, enhance communication and common effort on the on-going projects and progress and ease information flow, logistics and knowledge exchange within the projects and among the partners. It will also identify the potential of global collaboration and project planning. It will identify specific skills, expertise or technologies that can be applied to the project developments and improve resource efficiency for personnel and expertise between the EU and Japan. All partners will share and develop experience on integration of global partnership for accelerator projects.

The focus in this research and innovation project will be on the most critical items for progressing on the design, R&D, and prototyping and construction of the future accelerator facilities as outlined in B2.1.

The partners aim to develop new accelerators and the first beneficiaries of the results will be the members of the network. The societal impacts of the HL-LHC technologies includes medical applications such as improvements to hadron therapy for cancer patients, very compact PET cyclotrons and enhancements to magnetic resonance imaging (MRI) scans. The project will also result in the development of FELs (superconducting or normal conducting), medical accelerators for x-ray and proton therapy, and industrial accelerators for treatment of material and medical isotopes. The project can also foresee aiding the development of more compact accelerators, which save on cost, space and consumption.

3.3.4. Intellectual property rights aspects and exploitation of results.

Intellectual Property Rights (IPR)

Intellectual Property (IP) management will be described in detail in the Partnership Agreement, which will be signed by all the beneficiaries and partner organisations. All partners think that IP management provisions shall secure the maximum protection of all rights of the parties. It will also address the confidentiality of any information made available by the disclosing party to the receiving party/parties. In the event that a partner wishes to include background to the proposed joint research and innovation project, for the implementation and effective accomplishment of the project objectives, any such pre-existing background, including knowhow, will remain the property of the right holder. Any such background will be listed in the Partnership Agreement. Any other background not included in the list shall be automatically excluded from project use, although a partner has an option to add background during the project, as it sees fit, for the attainment of the project

objectives. Such inclusion of background shall be recorded in writing by the right holder. The foreground that may be created during the implementation of the E-JADE project at a host organisation, shall be vested to, and owned by the host organization.

Exploitation
The links with industry give the potential for societal benefits, as spin-offs are discovered and exploited. Ultimately, the development of new accelerator technology, will find users in European industry. For example, a beam instrumentation system might have value to other electron beam facilities, for example 3rd and 4th generation light sources. Commercialisation options will be investigated. The partners already have contacts and on-going collaborations with for example accelerator beam instrumentation companies in the UK and any possible commercial application will be discussed with European and Japanese collaborators and commercial partners. The new developed technology can be exported in the near future to the aerospace and automotive industries, research telescopes or satellites assembly to E-JADE only some examples.
All these results of the E-JADE project will be used in agreement with the provisions for exploitation and dissemination laid out in the Partnership Agreement. As part of the E-JADE project, all partners will submit the publications to open access repositories and journals, in line with the recommendations of the EC on open access to scientific information. Dissemination of research results will in most cases use journal publications as well as presentations/publications at conferences, seminars or workshops. Most of the deliverables of the project will be the object of a report. Any publication of results will take place according to the Intellectual Property Rights and publication policies agreed in the Partnership Agreement.

4. Implementation

4.1. Overall coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources

E-JADE comprises five work packages, where the first three focuses on the scientific and technological challenges outlined in B2 and the remaining chapters focus on the management of the programme, the training of the seconded and the communication of the results to all stakeholders involved. This programme addresses specifically the coherence of the ambitious strategy for future accelerators in the two regions. Three work packages tackle specific technical needs. The participants in each work package are leading institutes in their respective fields and are involved in the overall accelerator development projects in question, which ensures the coherence of E-JADE within the global effort. The effectiveness is increased by the fact that a significant number of ER will be seconded to Japan so as to strengthen ties on the managerial and strategic levels.

The individual tasks address key items, where the partners will bring their unique expertise to bear and will mutually benefit from the planned staff exchanges. Each work package has well-defined deliverables and commensurate resources, as outlined in Table B4. The secondments have been planned by the European project leaders and our Japanese partners so as to achieve the goals. Note that the actual R&D work is embedded in a global programme, which includes China and the US among others. E-JADE enhances the coherence of this ambitious R&D programme between Europe and Japan and thus embeds s

European engagement in a higher level of global coherence and efficiency in accelerator science. The direct involvement with Japan guarantees a strong European role in their future projects and continues to seed fruitful collaboration.
E-JADE will promote the secondment of young, as well as female researchers without applying positive discrimination.

Table B4. Work Package Description

Work Package Number	1						
Work Package Title	LHC consolidation, upgrades and R&D for future hadron machines						
Activity Type	Research						
Participant Short Name	CERN	KEK	UoT				
Person-months per Participant:	30	36	12				

Objectives

1. Execution of an intensified Japanese programme at LHC in preparation for future accelerator programmes
2. Advance the preparation for and execution of the European-Japanese collaboration on the High Luminosity LHC upgrade and associated R&D
3. Strengthen the R&D on High field magnets and RF systems for future or upgraded energy- and/or intensity-frontier hadron machines.

Description of Work

The LHC accelerator will run at its full energy from 2015 and Japanese researchers participate in operation, analysis and upgrade projects for both accelerator and detectors. R&D on high field magnets and wideband magnetic alloy RF systems is a key ingredient for upgrading the LHC, and its injectors through the LIU project, and for reaching the goals of the High Luminosity LHC project. These studies are also relevant for the J-PARC accelerators and for a potential very large collider as studied in the context of the FCC programme.

Task 1.1: LHC operation and analysis (CERN, KEK & UoT): Integrate Japanese efforts in operation of LHC machines and detectors at full energy; expected to provide important guidance for future accelerator developments in Europe and Japan.

Task 1.2: The HL-LHC project (CERN & KEK): Engineering design and validation of two short prototype separation superconducting dipoles (D1) followed by construction preparation, construction and test of the 4 final (plus two spare) D1 dipoles for the upgraded LHC insertion regions. Studies for the crab cavities (CC) for the LHC luminosity upgrade, benefitting from operational experience of CC at KEK.

Task 1.3 High field magnet R&D and preparation of future hadron injectors and colliders (CERN & KEK): R&D on the viability of HTS magnets of accelerator/collider quality. Enhance the exchange of staff between CERN and KEK in the context of the LIU project and the J-PARC intensity upgrade studies. Technologies of special interest are Wideband Cavities using Magnetic Alloy, Solid State Amplifiers and Low Level RF.

Deliverables

Month 25 Magnets and Gradients: Report on common R&D results on high field magnets and high gradient structures.

Month 25 Hadrons at high intensity and energy: Report describing R&D results on FCC and J-PARC related activities.

Month 37 Physics at LHC: Report covering main findings at LHC with relevance for future energy frontier accelerator projects.

Month 37 HL-LHC: Status report and final plan of the Japanese contribution to HL-LHC.

Work Package Number	2						
Work Package Title	Nanometre scale beam handling at the ATF						
Activity Type	Research, Training						
Participant Short Name	CERN	CNRS	CSIC	KEK	RHUL	UOXF	UoT
Person-months per Participant:	31	50	12	13	21	49	2

Objectives

1. Achievement and maintenance of nanometre scale beam size
2. Measurement and feedback to stabilise beam position at nanometre level
3. Development of advanced beam diagnostics instrumentation
4. Control of beam halo and background mitigation
5. Training of junior scientists and students in accelerator science

Description of Work: ATF at KEK operates an electron damping ring with ultra-low transverse emittances consistent with LC specifications. ATF2 is a low energy scaled version of the LC final focus beam line where the extracted ATF beam is used to test the sophisticated beam handling techniques planned at the collision point. The operation and R&D programme are managed by an international team involving all partners. Each task includes training and transfer of knowledge goals as integral parts.

Task 2.1 Beam Size Minimisation (CERN, CNRS, KEK & UoT): Reduce effective β* parameter by improving corrections of optical aberrations. Install, commission and operate two new octupole correction magnets. Study alternative optics.

Task 2.2 Wake Field (CERN, CSIC, KEK & RHUL): Calculate and measure wakefields from beam position monitors and collimators. Test novel wake field free steering algorithm.

Task 2.3 Ground Motion (CERN, CNRS & KEK): Measure ground motion (GM) using 14 installed GM sensors synchronised with beam position measurements to assess novel GM based feed-forward algorithm. Test newly developed GM sensor.

Task 2.4 Halo Collimation and Backgrounds (CNRS, CSIC, KEK & RHUL): Calculate and measure beam halo propagation. Develop and test two new retractable collimators for halo reduction. Simulate beam induced backgrounds with GEANT4.

Task 2.5 Beam Instrumentation and control (CNRS, KEK, RHUL, UOXF & UoT): Operate, simulate and optimise performances of existing instrumentation, including laser wire and nanometre resolution beam position and size monitors. Install, commission and operate new radiation hard diamond sensor beam tail monitor. Develop and test new submicron optical transition/diffraction radiation beam emittance diagnostics.

Task 2.6 Beam Position Feedback (KEK & UOXF): Install, commission and operate fast digital feedback for nanometre level beam position stabilization at the collision point. Use beam tracking simulation to model and benchmark feedback performance.

Deliverables

Month 12 HaloCollBgds-1: Report on halo measurement and control using diamond sensor and collimators.

Month 12 Instr-1: Report on performance optimisation of installed high resolution beam position and size instrumentation.

Month 24 Instr-2: Design report of optical transition/diffraction radiation combined measurement station including initial beam tests.

Month 18 GM-1: Reports on synchronisation of GM and orbit measurements and on new GM sensor performance.

Month 24 BeamSize-1: Report on performance of installed octupole magnet pairs in correcting third order optical aberrations.

Month 24 Wakefield-1: Report on wakefield simulation and measurements including mitigation plans and implications for the Linear Collider.

Month 24 Feedback-1: Report on operation of collision point feedback system.

Month 24 HaloCollBgds-2: Report on integrated simulation and evaluation of beam transport including beam instrumentation and charged particle backgrounds.

Month 36 Wakefield-2: Report on wakefield free steering performance to mitigate wakefields.

Month 36 GM-2: Final report on correlation between GM and orbit measurements and implications for GM based feed-forward.

Month 48 Feedback-2: Final report on performance of interaction-point feedback system, and implications for its implementation in the Linear Collider.

Month 48 BeamSize-2: Final report on beam size minimisation in horizontal and vertical dimensions using optimised optics, and implications for the Linear Collider.

Work Package Number	3						
Work Package Title	Linear Collider targeted R&D						
Activity Type	Research						
Participant Short Name	CERN	DESY	UOXF	KEK	CEA	CNRS	
Person-months per Participant:	16	70	10	55	8	4	

Objectives

1. Advance the R&D for Linear Colliders to match the requirements of the ILC for project implementation and optimise operation of LC in general

Description of Work: Based on the ILC Technical Design Report and the selected site, site-specific optimisations to the design have to be carried out. Visits of scientists will be necessary to do this.

Task 3.1 EDMS (CERN, DESY & KEK): Develop the scheme for an internationally accessible EDMS, which complements the Japan-specific engineering efforts and builds on European experience with large-scale projects. The Machine and Detector Integration and SRF activities will act as starting points.

Task 3.2 Machine and Detector Integration (CERN, CNRS, DESY & UOXF): Refine the description of the ILC Machine-Detector Interface to include the site-specific requirements while still meeting the demanding performance goals at high luminosity. Integrate the current detector assembly and installation plans with the conditions at the Iwate site. This also includes

the required detector infrastructure and services.

Task 3.3 SRF (CERN, CEA, DESY &KEK): Optimise the SRF production procedures for use at the ILC and define integration procedures for the multiply-sourced cavities.

Task 3.4 LC Optimisation: (CERN, CNRS, DESY & KEK): A high-intensity positron source is an important component of any LC. Positron polarisation is highly desirable and integral part of such a source. A common platform for CLIC and ILC has already been established which allows progress in this area. – There is a long-standing collaboration between Europe and KEK on development and testing of 12 GHz copper RF structures for use at a CLIC-based LC.

Deliverables

Month 6 EDMSReqUser: List of user requirements from the key stakeholders in the EDMS system

Month 18 ILCRep: ILC readiness report including: preparation of high-gradient cavity production, a plan for the international approach to engineering documentation, and a detector deployment study.

Month 38 LCOPT: Performance optimisation of Linear Collider operation including accelerating gradient of copper structures and yield of polarised positrons.

Month 48 SRFSharing: Documentation of international sharing of the SRF production

Month 48 EDMSDoc: Documentation of the international engineering of the ILC building on *EDMSReqUser.*

Month 48 MDIPlan: Site-specific ILC Detector installation plan

Work Package Number	4						
Work Package Title	Management and dissemination						
Activity Type	Management and dissemination						
Participant Short Name	CERN	KEK					
Person-months per Participant:	48	51					

Objectives

1. Management of programme
2. Setting up permanent offices at CERN and KEK
3. Communication inside the consortium
4. Dissemination of results to the general public

Description of Work

Task 4.1 Scientific and Financial Management (CERN & KEK): The management of the programme involves the organisation of programme events, managing the secondments of researchers and the financial planning, execution and reporting to the EU.

Task 4.2 CERN & KEK Offices (CERN & KEK): Permanent offices at CERN and KEK will be set up, which will support the researchers during the duration of their secondment.

Task 4.3 Communication (CERN & KEK): The Communication of E-JADE achievements experiences and results within the E-JADE programme will ensure most efficient sharing o knowledge and expertise of the seconded researchers. Annual meetings of all E-JADE

participants will be organized as well as topical workshops as described in B4.3.1

Task 4.4 Dissemination (CERN & KEK): A program for dissemination of information from E-JADE will be setup. This involves setting up public web pages and social media accounts as well as providing information for media and general public. Also the publication of results in scientific journal articles and participation in international conferences will be monitored

Deliverables

Month 2 Kickoff: Kick off meeting

Month 3 PubWWW: Setting up Public Web pages

Month 6 CERNKEKOffices: Offices at CERN and KEK in full operation

Months 12, 24, 36 and 48 E-JADE-Report: Annual and final reports including monitoring of publications and presentations

Months 20 and 45 IndustryWS: Industry workshops

Month 12 CommStrgy: Communication strategy report including links to communicators at the participating institutes

Month 36 E-JADESummary: Summary of dissemination activities

Work Package Number	5						
Work Package Title	Training and Knowledge Transfer						
Activity Type	Training						
Participant Short Name	CERN	DESY	All others				
Person-months per Participant:	4	4	2				

Objectives

1. Availability of high-level research training program
2. Increased experience and expertise of staff exchanged

Description of Work

Task 5.1: All beneficiaries and partners will provide an extensive, relevant and high-quality schedule of training courses, individual coaching sessions and research experience periods to the researchers to be exchanged. These efforts will be directed towards the exchange of knowledge and expertise available at project partners, for the benefit of visiting and resident researchers. A detailed description can be found under section 4.3.1.

Task 5.2: In order to achieve the objective of increasing skills, knowledge and experience of the staff exchanged, the knowledge transfer schedule must be fully implemented (see Task 5.1). In parallel, as also described in WP 4, the consortium will develop and approve at the kick-off meeting an evaluation framework that will monitor the implementation of the knowledge transfer, and evaluate with individual participants to what extent the efforts conducted have been successful, meeting the individual and overall goals, and where/when any adjustments or improvements are necessary.

Deliverables

Month 12 KTTool: Knowledge transfer evaluation tool

Month 48 KTTSummary: Knowledge transfer summary report

Table B5. Deliverables List

Deliverable No	Deliverable Name	Work Package No	Lead Participant Short Name	Nature	Dissemination Level[1]	Delivery Month
1	Magnets and Gradients	1	CERN	Report	PU	25
2	Hadrons at high intensity and energy	1	CERN	Report	PU	25
3	Physics at LHC	1	CERN	Report	PU	37
4	HL-LHC	1	CERN	Report	PU	37
5	HaloCollBgds-1	2	CNRS	Report	PU	12
6	Instr-1	2	CNRS	Report	PU	12
7	Instr-2	2	CNRS	Report	PU	24
8	GM-1	2	CNRS	Report	PU	18
9	BeamSize-1	2	CNRS	Report	PU	24
10	Wakefield-1	2	CNRS	Report	PU	24
11	Feedback-1	2	CNRS	Report	PU	24
12	HaloCollBgds-2	2	CNRS	Report	PU	24
13	Wakefield-2	2	CNRS	Report	PU	36
14	GM-2	2	CNRS	Report	PU	36
15	Feedback-2	2	CNRS	Report	PU	48
16	BeamSize-2	2	CNRS	Report	PU	48
17	EDMSReqUser	3	DESY	Report	PU	6
18	ILCRep	3	DESY	Report	PU	18
19	LCOPT	3	DESY	Report	PU	38
20	SRFSharing	3	DESY	Report	PU	48
21	EDMSDoc	3	DESY	Report	PU	48
22	MDIPlan	3	DESY	Report	PU	48
23	Kickoff	4	CERN	Event	PU	2
24	PubWWW	4	CERN	Web	PU	3

[1] Please indicate the dissemination level using one of the following codes:
PU - Public: fully open, e.g. web; **CO - Confidential:** restricted to consortium, other designated entities (as appropriate) and Commission services; **CI - Classified:** classified information as intended in Commission Decision Commission Decision 2001/844/EC.

25	CERNKEKOffices	4	CERN	Infrastructure	PU	7
26	E-JADE-Report	4	CERN	Report	PU	12,24, 36,48
27	IndustryWS	4	CERN	Event	PU	20,45
28	CommStrgy	4	CERN	Report	PU	12
29	E-JADESummary	4	CERN	Report	PU	36
30	KTTTool	5	DESY	Tool	PU	12
31	KTTSummary	5	DESY	Report	PU	48

4.2. Appropriateness of the management structure and procedures, including quality management and risk management

4.2.1. Project organisation and management structure

Management will be the object of a dedicated work package which will be led by the Scientific Coordinator (SC) and the Project Manager (PM). Prof. Dr. Steinar Stapnes, senior staff at CERN, currently leader of CERN's linear collider activities and former Deputy Spokesperson of the ATLAS project at CERN will be the SC. The PM will be appointed at the start of the project. A Supervisory Board (SB) formed of one representative of each beneficiary and partner organisation will oversee the staff exchange program. The chairperson of the SB will be Dr. Angeles Faus-Golfe of CSIC. The project management will interface directly with the project managements of the LHC, ATF, ILC, CLIC and J-PARC.

Project management structure

The detailed work plan and schedule of the staff exchange programme will be presented and validated during the kick-off meeting. It will include the secondments of the ER and ESR, from the technical point of view as well as the plans for training, dissemination and outreach. The tasks with associated milestones and deliverables will be monitored during the project. WP leaders will inform the Management Team (MT) if any changes to the objectives. The role and responsibilities of each body is described in the table below.

	Membership and organization	**Role**
Supervisory Board	The Scientific Coordinator The Project Manager One representative from each beneficiary and partner organisation The chairperson of the SB The SB will meet at the kick-off meeting and in follow-up meetings every year (four meetings in total)	Approve and oversee implementation of the staff exchange programme for scientific, technical and complementary skills and knowledge Monitor and evaluate overall progress of the research and innovation project Ensure best Transfer of Knowledge practice among the partners Approve the work plan and the exploitation plan
Management Team	The Scientific Coordinator The Project Manager The WP leaders	Communicate to/from the partners Organize and prepare documentation for the SB meetings, incl. scientific reports on achievements

		Communicate and report to the European Commission Coordinate of the staff exchange programme Prepare the research plan, incl. milestones and deliverables, and the exploitation plan
Work packages	Individual WP leaders. Each WP will have regular meetings every six months or more frequently if needed.	Manage the WP research programme Manage and follow-up the progress of the individual research and innovation projects Oversee the integration of the seconded researchers into the host organisations Disseminate best practices and results

Financial management

The coordinator (CERN) has the overall responsibility for financial management. CERN has longstanding experience in management of Marie Curie projects under FP6 and FP7. A specialized unit in the Human Resources (HR) Department coordinates all administrative and financial processes from project proposal to recruitment to production of annual reports, in close liaison with the Finance Department and the Internal Audit and EU offices in order to observe strict compliance with EC reporting standards. CERN also has a Legal Service which is available to give advice as required. The dedicated CERN-EU budget planning group will prepare a consolidated overview of the budgetary situation on the basis of the input of the partners.

Members Supervisory Board

Steinar Stapnes (CERN)	Olivier Napoly (CEA)	Angeles Faus-Golfe (CSIC)
Eckhard Elsen (DESY)	Philip Burrows (UOXF)	Katsuo Tokushuku (KEK)
Philip Bambade (CNRS)	Pavel Karataev (RHUL)	Sachio Komamiya (UoT)

Work Package and Work Package leader

1	Lucio Rossi (CERN)	4	Steinar Stapnes (CERN)
2	Philip Bambade (CNRS)	5	Thomas Schoerner-Sadenius (DESY)
3	Eckhard Elsen (DESY)		

Decision-making procedure

Executive decisions will be taken by the MT. Any changes in the staff exchange programme will have to be approved by the SB. Where such changes may have impact on the contractual obligations of the project, the prior agreement of the EC Project Officer in charge will be sought. Should disputes arise, the person in charge of the specific project, with input from the seconded researcher and the supervisor will intervene to try and solve disputes amicably. In cases where such amicable settlements were to fail, disputes will be settled by the Management Team whenever possible. When such resolution is not possible the matter will be raised to the SB. The gender balance will be insured at the level of decision-making within the project.

Communication strategy

The publication rules will be considered an integral part of the Partnership Agreement and the PM will be the responsible for making all necessary arrangements for review and/or amendments to it. The objective of the organisation and communication structure is to obtain maximum transparency for all the partners concerning the technical and overall project status. All information (meeting minutes, progress reports, relevant publications, etc.) will be

communicated to the PM, who assumes the responsibility for directing this information to the associated partners as appropriate. Communication between the seconded researchers and the partners in each Work Package will be coordinated by the WP leader. Frequent online-meetings will be encouraged.

4.2.2. Risks and the contingency plans

Risk management will be monitored throughout the project by each WP leader. The mitigation of technical and scientific risks is based on proven methodologies, the involvement of participants with the relevant expertise, and the setting of well-defined goals and deliverables on a realistic timescale. Any failure or delay in one WP or task will not have a "no-go" impact on the entire project. The WP leaders will lead risk resolution attempts and will be responsible for consulting the MT, and if needed the SB and the EU Project Officer, if any significant changes to the project are likely.

The LHC and its upgrade studies, as well as ATF, are well supported international projects where the overall risks for major strategy changes by the hosts are small. The largest risk in this project is the uncertainty relating to the political decision for hosting the ILC. While E-JADE in itself may be extra motivation to foster a Japanese decision to proceed with ILC, the ILC is of a magnitude that will necessitate complex considerations which reach far beyond questions of scientific excellence. In the event of a Japanese government negative decision on ILC part-way into E-JADE, it would no longer be reasonable to develop the Japan site-specific solutions. These aspects would hence be concluded. However, many aspects have intrinsic scientific merit. Examples are the demanding focussing and timing goals for the ATF that are equally relevant for CLIC, and the development of highly-performing SRF cavities which are of interest to many emerging accelerator developments. Such activities would therefore continue.

All other risks in the project are small and can be managed. If the project fails to complete ATF hardware on the proposed timescale, there is the possibility to negotiate an extension with ATF staff and reschedule the secondment for the beam tests. If a major accelerator failure occurs, the researchers would be able to complete the design of the hardware and publish the design report, including detailed simulations on expected performance. Inevitably, the schedule of secondments will vary over the four-year period of this project. The secondments in all WPs are planned so as to achieve the goals. Should the demand increase unexpectedly, the SB will arbitrate the resource needs based on the technical demands and scientific merits.

4.3. Appropriateness of the institutional environment (infrastructure)

4.3.1. Availability of the expertise and human resources

The goal of this exchange programme of seven European and two Japanese partners is to equip the seconded researchers and their organisations with a wide-ranging expertise in advanced accelerator engineering and a broad set of general, transferable skills. The staff exchange planning is shown in Form A. As can be seen the totals add up to 367 from Europe to Japan, and 173 man-months from Japan to Europe.

During the first year of the staff exchange programme the following ERs and ESRs will be seconded (list not exhaustive):

	Early-Stage Researchers	Experienced Researchers	Host
CERN		Steinar Stapnes Thibaut Lefevre Enrico Bravin Stefano Mazzoni	KEK / UoT
CEA			
CNRS	Oscar Blanco	Philip Bambade Sandry Wallon Frédéric Bogard	KEK / UoT
CISIC	Nuria Fuster	Angeles Faus-Golfe	KEK / UoT
DESY		Thomas Schörner-Sadenius	KEK / UoT
RHUL		Stewart Boogert Alexey Lyapin Emi Yamakawa Jochem Snuverink	KEK / UoT
UOXF		Philip Burrows Glenn Christian Colin Perry	KEK / UoT
KEK		Tatsushi Nakamoto Michinaka Sugano Katsuo Tokushuku Chihiro Ohmori	EU
UoT			

Transfer of Knowledge

Within this project several distinct measures are planned to secure the transfer of knowledge among the partners:

- Joint research and innovation projects on the design, R&D and prototyping of future accelerator facilities;
- Scientific and complementary (such as language) training programmes;
- Learning by experience during staff exchanges and informal meetings of project participants;
- Presentation of results in academic courses, lectures, workshops, seminars, conferences (as well as through the internet by webinars, e-learning courses etc.);
- Networking activities to reach a larger research community and the industry;
- Development of a joint research project pipeline.

Transfer of knowledge activities are expected to take place in both directions (Europe-Japan) and as well as in two dimensions (internal-external):

1. The researchers will bring along knowledge from their home organisation and will transfer this knowledge to the host organisation.
2. After returning to their home organisations, these researchers will bring along newly gained knowledge from their host organisation and will spread this knowledge further. Each seconded person will provide a final report on the stay. The more experienced researchers will manage the transfer and implementation of knowledge.
3. The newly recruited experienced researchers will transfer their specific knowledge to the host organisation and will acquire new knowledge at the host organisation during the project.

In addition, special measures will be taken to further optimize transfer of knowledge: a kick-off meeting with all partners will be held at the beginning of the project, presentation by the researchers at the host institute to the widest possible audience, topical workshops as described in B2.3, scientific publications and presentations at conferences (B3.3.1).

Expertise in training and supervision

The experts participating in this programme largely constitute the world experts in their respective fields. E-JADE thus brings together a solid core of scientists that are expected to achieve the goals over the foreseen period. Considerable staff is available at all the research organisations to support this endeavour. In particular, an ILC Office has recently been established at KEK to coordinate activities. Partners foresee the inclusion of dedicated offices at CERN and KEK to support this project both in Europe and Japan. Such a CERN office should be able to understand and support the needs of the European partners and to act as a bridge to Japan. Both KEK and CERN have considerable experience in facilitating the exchange of staff.

All partners in this project provide excellent R&D environments, ranging from sophisticated on-site facilities and computer networking to a legal and administrative framework that can effectively coordinate and facilitate collaboration on this scale. All have experience in training researchers and have extensive experience in hosting Marie Curie Fellows. CERN has coordinated 7 Marie Curie projects in FP6 and 11 in FP7. The consortium also has extensive experience with a long-lasting research partnership between Europe and Japan. For example, Prof. Dr. Philip Bambade of CNRS and Prof. Dr. Junji Haba of KEK are the directors of the French-Japanese TYL-FJPPL framework for exchange and collaboration in HEP and applications, which includes many joint projects on HEP accelerator science. The combined resources made available by both the European as the Japanese partners should guarantee an outstanding training environment for the ERs and ESRs.

Topical Workshop (TW)

Each beneficiary or partner organisation will organise a specialist Topical Workshop (TW) as described in B2.3. The TW will provide an opportunity for assessment of scientific progress in the subject, discussion and development of strategy and future directions in the scientific area, and presentation of industrial applications. The TWs will be distributed across the four-year period assuring a uniform distribution of effort across the consortium. All researchers from beneficiary and partner organisations within the R&D subject chosen will be expected to attend. Due to strong interconnections between the multiple disciplines and subjects, researchers from the partners as well as scientists external to the E-JADE will be able to benefit from these events. There will be an opportunity for younger researchers to give talks and present their research in poster sessions.

Facilities and support

All seconded researchers will be given access to the necessary office equipment to function efficiently (desk, computer, internet access, libraries etc.). The ESRs will receive some extra attention at their host organisation overseas. They will have the opportunity to receive additional training at the international LC school, the CERN accelerator schools or in local training and network events in Japan, such as the joint international Asia-Europe-Russia-America Accelerator School, Asian Europe Pacific School of High-Energy Physics and the

Japan Accelerator Society Annual Meeting. Researchers will have access to the necessary research infrastructure, according to the requirements of their research tasks and in line with the appropriate access rights. All seconded researchers will be given an introductory programme by each host which will include meetings with relevant persons and support with local administrative matters and daily life issues.

Integration and return mechanisms
ESRs will often require remote guidance/supervision by a more experienced researcher from their home organisation during their stay at the host. The supervisor will ensure a continuous information flow between the home department and the exchanged researcher. Steps for a successful preparation of return of exchanged staff and sustainable transfer of knowledge into the home organisation include: 1) information about the ideas and needs of the returnees (collecting information by dialogue, visits, questionnaires) 2) specific integration measures depend on the specific needs of the researcher (coaching, team building) 3) defining and complying with timescales for reintegration measures, and 4) guarantee of adequate infrastructure and managerial support.

After their return, the seconded staff will still act as 'liaisons' officer with the former hosts. In an internal workshop the researcher will present project results and new methods, and will describe his/her experiences. The progress of reintegration and its effects will be documented and will be used as a knowledge base for future exchange projects. Hence, integration and return mechanisms will contribute to the strategic objective of building long-term and sustainable partnerships between Europe and Japan, research organisations and specific teams, that keeps to collaborate and exchange after the end of this project.

4.3.2. Description of the necessary infrastructures
The project refers to excellent infrastructure in the individual laboratories, foremost at KEK and CERN where the majority of the R&D work described in this proposal is carried out. The other participating institutes have their own infrastructure for specific R&D projects and/or develop components being integrated into larger system-tests at KEK and CERN. Equipment for high-field magnet development and testing, cryogenics, SRF R&D, high power RF testing, and the ATF itself at KEK will be available to E-JADE participants, as they are being integrated in the R&D activities and local research groups. Of particular relevance to European scientist are the existing advanced facilities at KEK for the three technical work-packages described, related to LHC upgrade components, the ATF facility and ILC/LC studies.

4.4. Competences, experience and complementarity of the participating organisations and institutional commitment

The partners in this project all belong to the top in their field of expertise and all will bring in unique knowledge that will be shared with the other partners:

- **CERN** is the world's largest particle physics centre. CERN is an international laboratory providing some of the most technology advanced facilities, the largest one being the Large Hadron Collider (LHC). CERN is run by 20 member states and currently around 10000 scientists from 500 institutes from all over the world are involved in the research and technology programme. CERN is the host of the LHC and LHC upgrade project, including injectors. CERN is also the host the CLIC and

FCC studies for future high energy frontier machines. The organisation participates in ILC design studies and the ATF programme. CERN has extensive expertise in all aspects of RF and magnet systems for linear and circular machines, accelerator physics and core technologies for accelerator R&D, construction and operation.

- **CEA** Since 1952, CEA-Saclay is one of the nine research centres of the CEA that presently hosts more than 5000 researchers in multi-disciplinary fields like nuclear energy, biology, technology, climatology and basic research. IRFU is in charge of studies related to fundamental laws of the Universe. It participates in numerous large detector and accelerator projects, e.g. ATLAS, CMS, LHC, Soleil, Spiral2, ILC, CLIC and IFMIF. It has an advanced scientific and technological infrastructure such as proton sources and injectors for the IPHI, IFMIF and SPIRAL2 accelerator projects, a large infrastructure for the assembly of all the E-XFEL cryomodules and ESS cryomodule prototypes, and a cryogenic RF testing complex for superconducting cavities.
- **CNRS** laboratories LAL and LAPP have recognised expertise in beam physics and instrumentation, as well as significant experience operating accelerator facilities and leading R&D. LAL has been involved in world-class accelerator projects since its foundation. It has state of the art expertise in injectors, diagnostics and RF structures. The E-JADE project is designed to extend and reinforce the present collaborative activity of the CNRS groups at LAL and LAPP in instrumentation and beam physics for high luminosity energy & energy colliders, connecting local staff to international partners while working on several existing and future accelerator projects. CNRS has specific expertise in stabilisation and ground motion measurements as well as in beam dynamics and instrumentation for ultra-low emittance beams is central to future linear colliders and will be transferred to other teams involved through this project.
- **CSIC** is a Spanish laboratory having a long-standing reputation in theoretical and experimental physics. It has expertise in the design and construction of detectors and beam instrumentation for nuclear, medical and particle physics. One of the institutes of CSIC is IFIC, a Nuclear and Particle Physics institute where on-going research activities include experimental and theoretical work with application in near-term and far-future projects. The institute has been participating in leading particle physics experiments since 1950 when it was founded. It has a long tradition on detector development and computing for HEP. The group participating in the project has been involved in collider experiments (DELPHI, ATLAS) and neutrino experiments (NOMAD, HARP, K2K and T2K). The group participating in this proposal has been involved in accelerator activities in LHC, CLIC-CTF3, ILC-ATF2 and Medical Accelerators.
- **DESY** is one of the world-leading institutes for high-energy physics, accelerator physics and research with photons. It has operated the largest ever ep-collider HERA and is currently constructing the European XFEL, which employs the superconducting RF technology foreseen for the ILC. DESY is strongly engaged in the two large LHC experiments. Superconducting RF has matured at DESY for applications in high-current accelerators and in particular the European XFEL. DESY has advanced laboratory infrastructure for development of SRF components and quality assessment. DESY is the technological home of SRF technology and operates an extensive EDMS to support the on-going construction of the European XFEL, which uses the same technology.

- **RHUL** is a constituent college of the University of London and a founding and active member of the John Adams Institute (JAI) for Accelerator science. JAI has done leading work on beam instrumentation of the International Linear Collider (ILC) and has experience in advanced charged particle beam instrumentation, accelerator lattice design and accelerator optimisation. RHUL group is able to design, construct, test and commission any diagnostics apparatus from simple screens to complicated laser-based techniques. RHUL has expertise in background simulation via Geant4, which is used by different partners to simulate charged particle backgrounds at facilities such as the ATF2. In addition to this we also have expertise in wake-field electromagnetic simulation and using optics models to determine the effect of the wake-fields on low-emittance particle beam transport.
- **UOXF** conducts world-leading research in particle physics, accelerator science, astrophysics, condensed matter physics, atomic and laser physics, theoretical physics and the physics of planetary atmospheres, climate, and earth sciences. The John Adams Institute is one of only two university institutes of accelerator science in the UK, and indeed of few worldwide. The Oxford University Physics Department houses world experts in low-latency beam feedback systems for single-pass electron beam lines, which form key elements of the goals of the ATF2 project, and the ILC design. This complements the expertise of the other partners in related systems (BPMs, beam dynamics, magnet design, ground-motion measurement and correction) for producing and stabilising low emittance beams. Synergies will be achieved by an integrated approach to beam feedback and stabilisation at ATF2, ILC and CLIC which will lead to improved design of the machine-detector interface.
- **KEK** is the High Energy Accelerator Research Organization funded by the Japanese government as an Inter/University Research Institute Corporation. It is an internationally leading centre of excellence in accelerator science and technology for particle and nuclear physics, and material and life science. KEK features a wide range of particle accelerators among which the one of particular interest for the R&D of future particle accelerators is the KEK Accelerator Test Facility (ATF). This facility is a globally unique facility for the generation of ultra low-emittance electron beams providing a unique test-bed for developing diagnostics and instrumentation.
- **UoT** The University of Tokyo is the leading Japanese academic institution in the field of Particle Physics. Efforts are ongoing in the areas of LHC and its upgrades, the ILC preparation and the J-PARC activities and cover physics studies. The University of Tokyo is working closely together with KEK in most of the mentioned areas and hence share the unique facilities available at KEK. In addition, numerous related and complementary diagnostic and characterization techniques are available.

STOP PAGE COUNT – MAX 30 PAGES

5. References

1. The European Strategy for Particle physics-CERN Council, May 2013
2. The five-year research strategy for the Japanese national laboratory KEK–KEK 2013

6. Capacity of the participating organisations

CERN	
General Description	CERN, the European Organization for Nuclear Research, founded in 1954, is the world's largest particle physics centre. CERN is an international laboratory providing some of the most technology advanced facilities, the largest one being the Large Hadron Collider (LHC), CERN's flagship. CERN is run by 21 member states and currently around 11000 scientists from 500 institutes from all over the world are involved in the research and technology programme. CERN's mission is focused on 4 topics: research, technology, collaboration and education. CERN has a long and strong training tradition via the fellows, associate and student programmes. It has its own training and development department providing in average more than 10 000 person days of technical management, communication, academic, safety and language training.
Role and Profile of key people	Prof. Steinar Stapnes is leader of the CERN's linear collider studies. He was previously Deputy Spokesperson in the ATLAS experiment (2004-2009), and leader of the Strategy Sessions of the CERN Council 2008-2011. He is an experimental particle physicist and currently senior staff at CERN. Prof. Lucio Rossi is the leader of the High Luminosity LHC upgrade project. He has a doctor ship in physics in with a thesis on plasma physics and later conducting research on applied superconductivity. The HL LHC project aims at increasing by a factor 10 the luminosity performance of the LHC above its nominal value. In addition the project leaders of the FCC project (Michael Benedikt) and LIU project (Roland Garoby), the beams-department physicists Rogelio Tomas, Thibaut Lefevre and Markus Aicheler are involved in the project planning and execution.
Key Research Facilities, Infrastructure and Equipment	CERN is a unique high energy physics laboratory and is hosting over 15 particle accelerators for various energies, species and experiments, amongst them the most powerful particle accelerator world-wide: the LHC. CERN is pushing the technology development on a large variety of disciplines in order to be able to provide a suitable experimental environment for the particle experiments of tomorrow.
Do you have independent research premises?	Yes
Previous Involvement in Research and innovation projects	CERN has coordinated and hosted numerous ESR in FP6/FP7 projects and has dedicated EU-office for project implementation and reporting support.
Current involvement in Research and Innovation projects	Each year CERN offers about 15 Academic Training courses, covering many aspects of theoretical and experimental particle physics, in addition to advances in technology, computing, engineering. Additionally, CERN is running multiple EU financed projects in parallel (design studies, integrating activities, Marie Curie networks)
Publications and/or research/innovation products	• Detector Challenges at LHC, Nature 448, 290-296 • CLIC e+e- Linear Collider Studies, S.Stapnes et al, http://arxiv.org/abs/arXiv:1305.5766 • Superconductivity: its role, its success and its setbacks in the Large Hadron Collider of CERN; Lucio Rossi 2010 *Supercond. Sci. Technol.* 23 034001 doi:10.1088/0953-2048/23/3/034001 • HiLumi LHC design study moves towards HL-LHC; Rossi, Lucio (CERN) ; Szeberenyi, Agnes (CERN); CERN-ACC-NOTE-2014-0004

CEA Saclay	
General Description	Since 1952, CEA-Saclay is one of the nine research centers of the CEA that presently hosts more than 5000 researchers in multi-disciplinary fields like nuclear energy, biology, technology, climatology and basic research. In this very creative environment, Irfu is in charge of studies related to fundamental laws of the Universe. It participates to numerous large detector and accelerator projects, e.g. Atlas, CMS, LHC, Soleil, Spiral2, CLIC/ILC, and IFMIF.
Role and Profile of key people	Dr. Olivier Napoly, CEA project leader of the E-XFEL String and Module Assembly, member of the LCC/ILC Technical Board. Co-author of the TESLA and ILC Technical Design Report, he is experienced in the design and simulation of Linear Colliders.
Key Research Facilities, Infrastructure and Equipment	CEA/Irfu has an advanced scientific and technological infrastructure such as proton sources and injectors for the IPHI, IFMIF and SPIRAL2 accelerator projects, a large infrastructure for the assembly of all the E-XFEL cryomodules and ESS cryomodule prototypes, and a cryogenic RF testing complex SUPRATECH for superconducting cavities.
Do you have independent research premises?	Yes
Previous Involvement in Research and innovation projects	CEA/Irfu has coordinated in the FP6 CARE I3 project, has been involved in the FP6 EUROTeV, Eurisol Design Studies and the FP7 SLHC and ILC-HiGrade CNI-PP projects and EuCARD Integrated Activity (WP10-SRF Work Package leader).
Current involvement in Research and Innovation projects	CEA/Irfu is involved in the FP7 Hi-Lumi LHC Design Study, TIARA CNI-PP project and EuCARD2 Integrated Activity
Relevant publications and/or research/innovation products	• **Preliminary Study on HOM-Based Beam Alignment in the TESLA Test Facility,** DAPNIA-04-303 Presented at 2004 Linear Accelerator Conference (*LINAC 04*), Lübeck, Germany, 16-20 Aug 2004. • **The CARE project (Coordinated Accelerator Research in Europe).** O. Napoly (DAPNIA, Saclay) . 2006. 6pp. Prepared for 7th International Topical Meeting on Nuclear Applications of Accelerator Technology (AccApp05), Venice, Italy, 29 Aug - 1 Sep 2005. Published in **Nucl.Instrum.Meth.A562:585-590,2006**. • **Technical challenges for head-on collisions and extraction at the ILC.** O. Napoly *et al.* PAC07-THPMN005, SLAC-PUB-12744, EUROTEV-REPORT-2007-043, Jun 2007. 3pp. *In the Proceedings of Particle Accelerator Conference (PAC 07), Albuquerque, New Mexico, 25-29 Jun 2007, pp 2716*.

Centre National de la Recherche Scientifique (CNRS)	
General Description	The Centre National de la Recherche Scientifique is a government-funded research organisation under the authority of France's Ministry of Research. CNRS's annual budget represents a quarter of French public spending on civilian research. As the largest research organisation in Europe, CNRS carries out research in all fields of knowledge, through its seven CNRS Institutes : Institute of Chemistry (INC) ; Institute of Ecology and Environment (INEE) ; Institute of Physics (INP) ;Institute of Biological Sciences (INSB) ; Institute for Humanities and Social Sciences (INSHS) ; Institute for Computer Sciences (INS2I) ; Institute for Engineering and Systems Sciences (INSIS) ; the National Institute for Mathematical Sciences (INSMI); the National Institute of Earth Sciences and Astronomy (INSU); and the National Institute of Nuclear and Particle Physics (IN2P3).. It is also an important breeding ground for scientific and technological innovation, and has been one of the most active participants to previous and current European Framework Programmes. Over the past years, the CNRS has acquired an outstanding experience in coordinating FP Projects.
Role and Profile of key people	Philip Bambade (60%) is Directeur de Recherche at CNRS/IN2P3/LAL. His experience is in accelerator and particle physics at e+e− colliders (LEP collider at CERN and Stanford Linear Collider at SLAC in 1982-1989, DELPHI experiment at LEP in 1989-2003, R&D for ILC linear collider project since 2003). Since 2006, he leads teams of scientists working on the ATF2 linear collider final focus prototype at KEK. He chairs the Technical Board of the ATF international collaboration since 2011, and is the new French co-director of the *Toshiko Yuasa* France-Japan Particle Physics Laboratory (TYL-FJPPL), a bilateral scheme for exchanges of personnel and collaboration between French and Japanese scientists in particle physics and related techniques. He has significant experience supervising graduate students (7 PhDs in the past 10 years). Andréa Jérémie (25%) is Research Engineer at CNRS/IN2P3/LAPP. Her experience spans accelerators and particle detectors (Universities of Geneva and Montréal, ATF2 at KEK, CLIC at CERN, BaBar at Stanford and ATLAS at CERN). She has specialized expertise on state of art ground motion measurement and mitigation techniques required for the stabilization of linear collider magnets. She has coordinated the work of major international teams within European projects as EUROTeV and EuCARD. She is currently member of the ATF Technical Board and the French co-leader of a collaboration project on ATF2 within TYL-FJPPL. Sandry Wallon (70%) is Research Engineer at CNRS/IN2P3/LAL, with experience in mechanical and thermal engineering (CNGS, ILC cryomodules, XFEL couplers, ATF2). He has a teaching qualification (*agrégation*) in mechanical engineering.
Key Research Facilities, Infrastructure and Equipment	The LAL and LAPP laboratories of CNRS/IN2P3 both have well-equipped state of the art electronics laboratories and mechanical shops. Several clean rooms are available for electrical and radiation tests of sensitive sensor samples. The RF coupler conditioning facility, where the entirety of the couplers for the XFEL project at DESY are being processed, is unique in the world. In addition, LAPP manages an impressive computing farm used by many different communities and is fully integrated in the European Grid (EGEE). It is also a Tier2 for ATLAS and LHCb.
Do you have independent research premises?	At LAL, the PHIL photogun electron source offers outstanding possibilities for both R&D on low emittance high intensity ultra-short electron bunches nd calibration of instrumentation over large ranges of parameters.
Previous Involvement in Research and Innovation projects	LAL and LAPP are beneficiary partners of the EU FP7 funded EGEE-III, EDGES, ILC-HiGrade, ET, AIDA, CTA-PP, LAGUNA-LBNO and EUCARD contracts. In addition, the following contracts with the Agence Nationale de la Recherche have been funded: Proto-BiPo, ATF2-KEK, PMm2, DHCAL, MightyLaser, PETAQCD, Siminole, Higgs-TeV, HiggsTime, HiggsNET, CKMfitterLHC, ToolsDMColl, EGI-Inspire, SPLAM, DMAstroLHC, Stereo, VITESSE.
Current involvement in Research and Innovation Projects	LAL is coordinating a research educational bilateral program with Ukraine. Moreover, LAL has been granted several LABEX R&D grants and one major EQUIPEX infrastructure grant to build the ultra-high rate compact ThomX Compton source. LAPP is leader in a LABEX grant.
Publications and/or research/innovation products	• G. White, P. Bambade, A. Jérémie et al., Phys.Rev.Lett. 112, 034802 (2014); • E. Marin, P. Bambade et al.: Phys.Rev.Sp.Topics – Acc.&Beams 17, 021002 (2014); • T. Okugi, P. Bambade et al.: Phys.Rev.Sp.Topics – Acc.&Beams 17, 023501 (2014); • Y. Renier, P. Bambade et al.: Phys.Rev.Sp.Topics – Acc.&Beams 16, 062803 (2013);

CSIC	
General Description	The CSIC is a Spanish laboratory having a long-standing reputation in theoretical and experimental physics. From the experimental point of view, it has expertise in the design and construction of detectors and beam instrumentation for nuclear, medical and particle physics. **CSIC** is the largest public multidisciplinary research organization in Spain. It has 116 institutes or centres distributed throughout Spain. There is also a delegation in Brussels. **IFIC**: is a Nuclear and Particle Physics institute where ongoing research activities include experimental and theoretical work with application in near-term and far-future projects. The institute has been participating in leading particle physics experiments since 1950 when it was founded. IFIC is participating in several Postgraduate Programs of the Valencia University; around 70 of the 250 member of IFIC are PhD students. It has a long tradition on detector development and computing for HEP. The experimental group has been involved in collider experiments (DELPHI, ATLAS) and neutrino experiments (NOMAD, HARP, K2K and T2K). The group participating in this proposal has been involved in accelerator activities in LHC, CLIC-CTF3, ILC-ATF2 and Medical Accelerators.
Role and Profile of key people	**Angeles Faus-Golfe:** Research Scientist at IFIC-CSIC since 2007, currently in charge of the Accelerator Physics Group (GAP) at IFIC (http://gap.ific.uv.es/). Her main expertises are: Design optics and beam dynamics and Beam instrumentation design and construction. She has been participating in 33 National projects, leading 12 of them, 5 EU Infrastructures projects (CARE, EUROTeV, EUCARD, EUCARD2 and HL-LHC), 2 EU ITN (PARTNER and PACMAN) and leading 11 International Collaboration Projects with CERN, LAL-Orsay, LLR-Ecole Polytechnique Palaiseau and KEK. She is leading the multi_OTR project at ATF2 KEK.
Key Research Facilities, Infrastructure and Equipment	The mechanical engineering facilities at CSIC consist of CAD/CAM and FEA computer tools to design and simulate mechanical parts, as well as a high precision workshop suitable for building these parts. In addition the facility is provided with a metrology room, which consist of a vision CMM, and a contact CMM (Coordinate Measuring Machine. The general electronic lab which stands out mainly in multilayer PCB manufacturing with prototyping and small series production capability and the Accelerator Instrumentation lab specialized in testing and characterization of specific devices, mainly using RF and photo detection technology applied to particle beam monitoring. Other resources would be also available like a clean room of class 10.000 and 1000. New High-Gradient RF laboratory to test accelerator structures at 3 GHz frequency is being constructed
Do you have independent research premises?	yes
Previous Involvement in Research and innovation projects	IFIC Accelerator Group (GAP) has been participating in 35 National Project, 5 EU Infrastructures projects (CARE, EUCARD, EUCARD2, HL-LHC and PARTNER) and leading 11 International Collaboration Projects with CERN, LAL-Orsay and LLR-Ecole Polytechnique Palaiseau.
Current involvement in Research and Innovation projects	Currently the group is involved in 2 National Project, 3 EU projects (EUCARD2, HL-LHC and PACMAN) and 3 International Collaboration Projects with CERN, LAL-Orsay and KEK. Concerning the training the IFIC is involved in some University masters.
Publications and/or research/innovation products	1. M. Benedikt, A. Faus-Golfe, F. Schmidt, R. Tomas and P. Urschütz , Driving Terms experiments at CERN. Phys. Rev. ST Accel. Beams 10, 034002 (2007). 2. ATF2 collaboration. Experimental validation of a novel compact focusing scheme for future energy frontier linear lepton collider. Phys. Rev. Lett. 2014 Jan(24) 112(3):034802 3. S. Verdu-Andres, U. Amaldi, A. Faus-Golfe, CABOTO, a high-gradient linac for hadrontherapy. Journal of Radiation Research, 2013, 54, i155-i161.

DESY	
General Description	DESY is one of the world-leading institutes for high energy physics, accelerator physics and research with photons. It has operated the largest ever ep-collider HERA and is currently constructing the European XFEL, which employs the superconducting RF technology foreseen for the ILC. With a staff of 2000 DESY is attracting thousands of guest scientists each year. DESY has strong ties to universities and is engaged in the training and education of students.
Role and Profile of key people	**Prof. Eckhard Elsen** is senior scientist at DESY with long track record on particle physics, both on the accelerator and detector side starting from JADE at the PETRA collider in the 1970's. He was spokesperson of the H1 collaboration at DESY's HERA collider and is a world expert on superconducting RF cavities. He has been a key member of the ILC Global Design Effort and is the current chair of LHC committee (LHCC). **Dr. Karsten Buesser** is staff scientist at DESY. Dr. Buesser has made leading contributions to the ILC Machine-Detector Interface since 2004 and is currently the convenor of the ILC Machine-Detector Interface working group. He is a member of the LCC Physics and Detectors Board and of the ILD detector concept group. **Dr. Jenny List** is staff scientist at DESY and has a long track record on physics at e^+e^- colliders starting from the OPAL experiment at LEP. She is currently leading the effort of sharpening the ILC physics case and is member of ILC beam parameter working group. **Dr. Thomas Schoerner-Sadenius** is staff scientist at DESY and has profound experience in detector operations and in managing large-scale projects. He has been working on experiments at LEP, HERA and LHC. **Dr. Marcel Stanitzki** is staff scientist at DESY. He has a long track record on detector design and integration at LEP, the Tevatron and the LHC and is the current co-spokesperson of the SiD detector consortium for the ILC.
Key Research Facilities, Infrastructure and Equipment	DESY has matured superconducting RF for applications in high-current accelerators and is a strong partner in building the European XFEL. It has advanced laboratory infrastructure for development of SRF components and quality assessment. DESY is the technological home of SRF technology.
Do you have independent research premises?	Yes, PETRA, HERA, FLASH and a partner in European XFEL
Previous Involvement in Research and innovation projects	DESY has been engaged in numerous FP6 and FP7 projects. In the context of this proposal CARE, ILC-HiGrade and CRISIP are the most relevant.
Current involvement in Research and Innovation projects	DESY scientists have been key authors for the Technical Design Report of the International Linear Collider now considered for construction in Japan. DESY has contributed to the physics case, the detector concept and the accelerator itself. DESY is carrying out high-gradient research on the basis of the large number of cavities delivered for the European XFEL and for specific ILC-HiGrade research.
Publications and/or research/innovation products	• The International Linear Collider Technical Design Report (2012) • Editors: K. Buesser, E. Elsen, J. List, M. Stanitzki et. al. • SiD Letter of Intent (2009) M. Stanitzki et. al. • ILD Letter of Intent (2009) K. Buesser, J. List et. al

Royal Holloway (RHUL)	
General Description	RHUL is one of 18 Colleges and Institutes of the University of London and a founding and active member of John Adams Institute (JAI) for Accelerator Science founded jointly with University of Oxford, Imperial College and the UK Science and Technology Facilities Council. All members of staff at the Department of Physics were carefully selected and recruited among the world's leading researchers to integrate the world class research into the education process. The JAI mission is to promote high quality research, training-through-research, industrial links and outreach activity.
Role and Profile of key people	Dr. Pavel Karataev (20%), Senior Lecturer, Deputy Director of Graduate Studies, and a leader of initiatives in the UK, USA, Japan, Russia and Switzerland. He has over 15 years of experience in Accelerator Science, supervised 3 PDRAs and 7 PhD students. Dr. Stewart Boogert (20%) is a Reader and a Deputy Director of JAI. His research interests are primarily in: a) the development of state of the art accelerator beam diagnostics, devices used to understand and control high energy, low emittance charged particle beams. It includes cavity beam position monitor systems, laser-electron beam interactions, control systems, beam dynamics and feedback systems; b) the upgrade of the Large Hadron Collider, so called High Luminosity LHC. Dr. Alexey Lyapin (20%) is an Accelerator Physicist with experience in low level RF, EM simulations, precision beam diagnostics and signal processing. He will co-supervise the ESR, training him in EM simulation technology and participate in organization of the events.
Key Research Facilities, Infrastructure and Equipment	The Accelerator Physics Laboratory at RHUL is a facility for development and tests of advanced instruments before installation at national and international accelerator laboratories. The lab features state of the art RF, microwave and optical test equipment for emitting, transporting and detecting EM waves in the frequency range from MHz to a few hundred GHz. The group has a software licence for optical simulation code ZEMAX, which was used to develop a sophisticated simulation package using Physical Optics Propagation mode available to the fellow to simulate realistic optical transport lines. A 200-CPU cluster with EM code GdfidL installed allows for advanced simulations. The ESRs will have an access to Terahertz Imaging Laboratory and Nanofabrication facilities in the department.
Do you have independent research premises?	
Previous Involvement in Research and innovation projects	John Adams Institute for Accelerator Science founded in 2004 was funded from 2004-2008 (JAI1) and 2008-2012 (JAI2). RHUL is a beneficiary partner of the FP7 Marie Curie Initial Training Network (DITANET) on advanced beam diagnostics funded from 2008 – 2012. CLIC-UK Collaboration for accelerator science and technology development was funded by CERN for 3 years for the period 2011 - 2014. FP6 Priority 3 Integrated projects to SME "A low cost and fully passive Terahertz inspection system based on nano-technology for security applications". Our group is coordinating research programs in the UK, Switzerland, USA, Japan, Sweden and Russia.
Current involvement in Research and Innovation projects	John Adams Institute for Accelerator Science was founded in 2004 as a centre of excellence for training the next generation of scientists. The funding of JAI3 was approved by Science and Technology Facilities Council for the period form 2012 – 2016. We are beneficiary partners of the FP7 Marie Curie Initial Training Network (oPAC) and associate partners of another network (LA^3NET). CLIC-UK 2 Collaboration for accelerator science and technology development funding was recently approved by CERN for 3 years, for the period 2014 - 2017.
Relevant publications and/or research/innovation products	P. Karataev, et al., Physical Review Letters 93**,** 244802 (2004); P. Karataev, S. Boogert, et al., Physical Review Letters 107, 174801 (2011); A.Lyapin, S. Boogert, et al., JInst, Vol. 6, No. 02, p. P02002 (2011); G.White, P.Karataev, S. Boogert, et al., Physical Review Letters 112, 034802 (2014); S. Boogert, P. Karataev, et al., Physical Review Special Topics – Accelerators and Beams 13, 122801 (2010); A.Lyapin, et al., JInst, Vol. 6, No. 02, p. P02002 (2011);

University of Oxford (UOXF), UK	
General Description	The University of Oxford is the oldest university in the English-speaking world, and has been one of the world's most influential and international universities for centuries. It is renowned globally for both its research and teaching. Oxford has more world-leading academics and a higher research income (£437M in 2012/13) than any other UK university. It conducts research across all disciplines. Students and scholars have access to unrivalled academic resources including the largest university library system in the UK. Oxfordshire is one of Europe's leading centres of enterprise, innovation and knowledge. The county's growth rate in high-tech employment remains one of the highest in the UK and many of its 1,500 high-tech companies have links to Oxford University. Oxford Physics has 104 permanent academic staff, 24 long term research fellows, 185 postdoctoral researchers and 162 technical and support staff. There are currently 721 undergraduate and 303 graduate students working for degrees in the department. It receives about £18M research funding each year.
Role and Profile of key people	**Philip N. Burrows**, Professor and Associate Director of the John Adams Institute; 25 years' experience in particle physics detectors, accelerator beam instrumentation and diagnostics, and beam physics; has supervised more than 10 PDRAs and 30 PhD students; he has lead in numerous large international collaborations including several large-scale EU FP6 and FP7 projects; Spokesperson of the CLIC accelerator collaboration; Chair of the ATF International Collaboration Board; **Glenn Christian**, Lecturer; more than 10 years' experience in beam instrumentation and diagnostics systems; **Colin Perry**, senior electronic engineer; 35 years' experience of designing, building and commissioning advanced electronic systems including beam position monitor and feedback systems. Supported by the following current RAs: **Douglas Bett**, beam diagnostics and feedback; **Young Im Kim**, beam position monitor electronics.
Key research facilities, infrastructure and equipment	Oxford University Physics Department conducts world-leading research in particle physics, accelerator science, astrophysics, condensed matter physics, atomic and laser physics, theoretical physics and the physics of planetary atmospheres, climate, and earth sciences. The John Adams Institute is one of only two university institutes of accelerator science in the UK, and indeed of few worldwide. We partner with the Diamond Light Source, ISIS Spallation Neutron source, and RAL Central Laser Facility to provide local access to hands-on training for students in accelerator science. In addition, we are key partners in R&D projects at CERN, DESY, SLAC and KEK, where we provide on-site training for our students. The Burrows group is a lead collaborating partner at the CERN CLIC Test Facility and at the Accelerator Test facility at KEK, which are internationally-leading infrastructures for the production, acceleration and instrumentation of high-energy electron beams.
Independent research premises	
Previous involvement in research and innovation projects	Oxford University Physics Department is the lead partner in the John Adams Institute for Accelerator Science, which is a world-leading centre of excellence for R&D and training at the PhD in accelerator science. Since the Institute's foundation in 2005 we have provided training for, on average, 10 students per annum via a dedicated year-long course in accelerator science and technology, as well as our portfolio of advanced accelerator R&D projects. The Burrows group has been a lead partner in FP6 (EuroTeV, CARE) and FP7 (EUCARD, HiGrade, TIARA) projects.
Current involvement in research and innovation projects	Oxford is one of the largest recipients of FP7 funding across the EU. The University is involved in a number of EU funded research and training programs and is presently involved in several ITNs, as well as in a number of Individual Fellowships. It has a dedicated EU project team that supports the PIs and the fellows throughout a project.
Relevant publications	G. R. White et al, Phys. Rev. Lett. 112 034802 (2014). P.N. Burrows, PoS ICHEP2012 542 (2013). P. Bambade et al, Phys. Rev. ST Accel. Beams 13 042801 (2010). J. Resta Lopez, P.N. Burrows, G.B. Christian, JINST 5 P09007 (2010).

KEK	
General Description	KEK is the High Energy Accelerator Research Organization funded by the Japanese government as an Inter/University Research Institute Corporation. It is an internationally leading centre of excellence in accelerator science and technology for particle and nuclear physics, and material and life science.
Role and Profile of key people	**Prof. Katsuo Tokushuku** is the leading physicist in the CERN-KEK relations. Since 2012 he is the Deputy Director of the IPNS (Institute of Particle and Nuclear Studies) at KEK. He is also member of the CERN Science Policy Committee. He has had leading roles in the ZEUS experiment at DESY and the ATLAS Experiment at CERN. Prof. Tokushuku has been member of many review and advisory bodies including the LHCC. **Prof. Akira Yamamoto**, Head of KEK's Linear Collider Project Office and leading expert in the magnet development for the HL-LHC upgrade project.
Key Research Facilities, Infrastructure and Equipment	KEK hosts a wide range of particle accelerators and presently upgrades the highly successful KEKB collider. KEK is also operating the J-PARC facility. Among the accelerators that are of particular interest for the R&D of future particle accelerators is the KEK Accelerator Test Facility (ATF). This facility is a globally unique facility for the generation of ultra low-emittance electron beams providing a unique test-bed for developing diagnostics and instrumentation.
Do you have independent research premises?	Yes
Previous Involvement in Research and innovation projects	KEK has several on-going collaborations with European institutes within particle physics – most notably a strong presence in LHC, on technology development and plays a leading role in national research. KEK is engaged in the LHC and in the ATLAS experiment.
Current involvement in Research and Innovation projects	KEK is member of the HL-LHC Design Study.
Publications and/or research/innovation products	• **LHC Now and its Future Prospect** Katsuo Tokushuku (KEK, Tsukuba). Oct 2011. 8 pp. DOI: 10.1142/9789814412322_0020 • **The International Linear Collider Technical Design Report** (2012) • **Letter of Intent for the Phase-I Upgrade of the ATLAS Experiment** CERN-LHCC-2011-012 ; LHCC-I-020 **Letter of Intent for the Phase-II Upgrade of the ATLAS Experiment** CERN-LHCC-2012-022 ; LHCC-I-023

University of Tokyo (UoT)	
General Description	The renowned University of Tokyo is also the leading Japanese academic institution in the field of Particle Physics and is attracting the best students in Japan. The university has a long tradition of collaborating with international institutions. UoT has long been engaged at DESY and CERN, most recently as a key member of the ATLAS experiment.
Role and Profile of key people	**Prof. Sachio Komamiya,** Director of International Centre for Elementary particle physics, Chair of High Energy Committee of Japan and Chair of the International Linear Collider Board
Key Research Facilities, Infrastructure and Equipment	The University of Tokyo is working closely together with KEK in most of the mentioned areas and hence share the unique facilities available at KEK. In addition, numerous related and complementary diagnostic and characterization techniques are available.
Do you have independent research premises?	Yes
Previous Involvement in Research and innovation projects	UoT has collaborated widely within the national landscape of High Energy Physics and is proud on some long lasting collaboration with European institutes. Common research projects are executed within a multitude of funding schemes.
Current involvement in Research and Innovation projects	Currently efforts are ongoing in the areas of LHC and its upgrades, the ATLAS experiment, the ILC preparation and the J-PARC activities and cover physics studies.
Publications and/or research/innovation products	• **Letter of Intent for the Phase-I Upgrade of the ATLAS Experiment** CERN-LHCC-2011-012 ; LHCC-I-020 **Letter of Intent for the Phase-II Upgrade of the ATLAS Experiment** CERN-LHCC-2012-022 ; LHCC-I-023 • **Measurement of nanometer electron beam sizes with laser interference using Shintake Monitor** Jacqueline Yan, Yohei Yamaguchi (Tokyo U.), Yoshio Kamiya (Tokyo U., ICEPP), Sachio Komamiya, Masahiro Oroku (Tokyo U.), Toshiyuki Okugi, Nobuhiro Terunuma, Kiyoshi Kubo, Toshiaki Tauchi, Junji Urakawa (KEK, Tsukuba). 2014.Published in Nucl.Instrum.Meth. A740 (2014) 131-137 DOI: 10.1016/j.nima.2013.11.041 • **The International Linear Collider Technical Design Report (2012)**

7. Ethics Issues

All research activities in Horizon 2020 should respect fundamental ethics principles, including those reflected in the Charter of Fundamental Rights of the European Union.[2] These principles include the need to ensure the freedom of research and the need to protect the physical and moral integrity of individuals and the welfare of animals.

Research ethics is of crucial importance for all scientific domains. Informed consent and confidentiality are as important for a sociological study as they are for clinical research.

All proposals considered for funding will be submitted to an Ethics Review. The Ethics Review is the core of the H2020 Ethics Appraisal scheme, which concerns all proposals and projects, and also includes the Ethics Checks and Ethics Audit that can be initiated during the project implementation.

In this context, please be aware that it is the applicants' responsibility to identify any potential ethics issues, to handle the ethics aspects of their proposal, and to detail how they plan to address them.

If you have entered any ethics issues in the ethics issues table in Part A of the proposal, you must submit an ethics self-assessment. For more details, please refer to the Ethics Self-Assessment Guidelines under Horizon 2020.[3]

Your self-assessment must:

1) Describe how the proposal meets the national legal and ethics requirements of the country or countries where the tasks raising ethics issues are to be carried out.

Should your proposal be selected for funding, you will be required to provide the following documents, if they are already in your possession:

- The ethics committee opinion required under national law
- The document that is mandatory under national law notifying activities raising ethics issues or authorising such activities

If these documents are not in English, you must also submit an English summary of them (containing, if available, the conclusions of the committee or authority concerned).

If you plan to request these documents specifically for your proposed project, your request must contain an explicit reference to its title.

2) Explain in detail how you intend to address the issues in the ethics issues table, in particular as regards:

[2] Charter of Fundamental Rights of the European Union, 2000/C 364/01. See also http://www.europarl.europa.eu/charter/default_en.htm

[3] The Ethics Self-Assessment Guidelines under Horizon 2020 is available on the Participant Portal

- Research **objectives** (e.g. study of vulnerable populations, dual use, etc);
- Research **methodology** (e.g. clinical trials, involvement of children and related consent procedures, protection of any data collected, etc);
- The potential **impact** of the research (e.g. dual use issues, environmental damage, stigmatisation of particular social groups, political or financial retaliation, benefit-sharing, malevolent use, etc).

8. **Letters of Commitment of partner organisations**

INTER-UNIVERSITY RESEARCH INSTITUTE CORPORATION
HIGH ENERGY ACCELERATOR RESEARCH ORGANIZATION
KEK
1-1.OHO.TSUKUBA-SHI
IBARAKI-KEN.305-0801 JAPAN
http://www.kek.jp/

Atsuto Suzuki
Director General, KEK
Oho 1-1, Tsukuba,
Ibaraki 305-0801, Japan
Tel +81 29 864 5101
E-mail atsuto.suzuki@kek.jp

Professor Steinar Stapnes
CERN
Geneve 23
CH-1211, Switzerland
Dear Prof. Steinar Stapnes,

KEK is the High Energy Accelerator Research Organization funded by the Japanese government as an Inter-University Research Institute Corporation. It is an internationally-leading centre of excellence in accelerator science and technology for particle and nuclear physics, and material and life science .

KEK has set the priorities for future accelerator developments in the next 5 year period on participation in the LHC programme at CERN including its upgrades, as well as upgrades of the J-PARC facility and preparation for ILC as a possible global facility hosted by Japan. General R&D for future accelerators, including for purposes outside particle physics, is also a priority for our laboratory. In all these areas we collaborate with European partners and have been interested in further collaboration in developing the KEK roadmap and the European roadmap for future machines where we have common interests.

Among the local facilities with particular interest for the R&D of future machines is the KEK Accelerator Test Facility (ATF). ATF is a globally unique facility for the generation of ultra low-emittance electron beams providing a unique test-bed for developing diagnostics and instrumentation for characterising the very small beams (nano-beams) that are required at next-generation electron-positron linear colliders and light sources.

The European participants in E-JADE constitute the closest European collaborators related to these projects. The E-JADE proposal is an excellent initiative for formalising and

substantially increasing the exchange of staff members related to advancement of these projects, providing training and familiarisation for the researchers from the two regions. Since there is in general a worldwide shortage of highly-skilled accelerator scientists and engineers, the initiative is very timely, and is targeted at meeting future needs in this area of critical skills shortage. I am therefore writing in strong support of the E-JADE proposal.

We look forward to collaborating and exchanging staff members with the European participants in the proposal in the areas of hadron machine R&D and upgrades - notably LHC, J-PARC, and ILC preparation as well as exploitation and improvement at ATF. Exchanging knowledge and expertise in the area of industrial capabilities in the two regions is also very interesting, and we consider setting up a KEK office at CERN, and CERN office at KEK a high priority for further collaboration and for improving the possibilities for staff-exchanges and visits. Our current planning for secondment of KEK staff to Europe in the framework of this proposal is described in the A-forms of the proposal.

We hope the project will allow our staff members to carry out the work proposed and we are also welcoming the European project exchange staff to our institute and will integrate them in our research activities as described in the proposal.

Sincerely,

April 17, 2014

Atsuto Suzuki
Director General
KEK

東京大学
THE UNIVERSITY OF TOKYO

Sachio Komamiya
Professor, Department of Physics,
Graduate School of Science, and
Director of International Center for
Elementary Particle Physics (ICEPP),
The University of Tokyo
7-3-1 Hongo, Bunkyo-ku,
Tokyo 113-0033 JAPAN
Tel: +81-3-3815-8384
E-mail: sachio@icepp.s.u-tokyo.ac.jp

Professor Steinar Stapnes
CERN
Geneva 23
CH-1211 Switzerland

Dear Professor Stapnes,

The University of Tokyo is the leading Japanese academic institution in the field of Particle Physics. We have a broad programme of research. Activities most relevant to E-JADE staff-exchange project are the LHC and its upgrade programme, the ILC preparation and the J-PARC programme. The activities cover from physics studies to R&D for detectors and accelerators. The University of Tokyo works closely with KEK (the Japanese National High Energy Accelerator Research Organization) in most of these areas, and also related to strategy processes for future accelerator facilites in Japan and elsewhere with interest for Japan.

We already collaborate closely with several European participants in E-JADE, and welcome the opportunity to exchange personnel and initiate longer term secondments with these institutions, in all areas covered by the proposal. This would create a significantly higher level of integrated effort. Our current planning for the secondment of the University of Tokyo staff to Europe in the framework of this proposal is described

in the A-forms of the proposal.

We would also welcome secondments from European institutions to the University of Tokyo, and are able to provide a research environment and a scientific/cultural experience in central Tokyo which we believe is inspiring for visitors, and will help advance common European and Japanese efforts to realise future accelerator facilities in the two regions. During the next five years we need to make significant progress towards the implementation of several future facilities, and the University of Tokyo is a centrally placed actor in the formulation of Japanese science policy. European secondments in the areas of project management, dissemination, and studies to address central scientific policy issues, are also welcome.

Sincerely yours,

20th April 2014

Sachio Komamiya
Professor
The University of Tokyo

ENDPAGE

MARIE SKŁODOWSKA-CURIE ACTIONS

Research and Innovation Staff Exchange (RISE)
Call: H2020-MSCA-RISE-2014

PART B

“E-JADE”