



European Coordination for Accelerator Research and Development

## PUBLICATION

# Project factsheet for EC DG RTD brochure

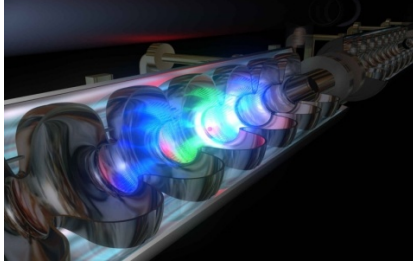
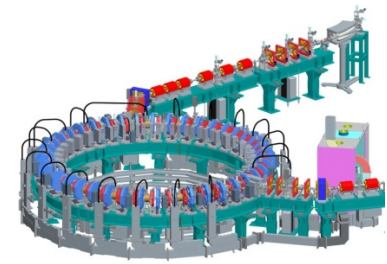

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The electronic version of this EuCARD Publication is available via the EuCARD web site <<http://cern.ch/eucard>> or on the CERN Document Server at the following URL :  
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FLASH, DESY, Hamburg, DE	EMMA, STFC, Daresbury, UK	LHC, CERN, Geneva, CH



## European Coordination for Accelerator Research and Development

*Acting like giant microscopes, particle accelerators give us a unique insight into the basic constituents of nature (matter, forces, energy). With the Large Hadron Collider, the most advanced accelerator soon in service, particle physics and cosmology are on the threshold of a new era of discoveries, recreating conditions just moments after the Big Bang. In addition, many accelerators contribute to medical imaging, cancer therapy, biology, material science as well as industry. With such a wealth of scientific and technical fields relying on accelerator technology, the European Strategy Group for Particle Physics has selected common priority areas of accelerator research and development including high-field magnets, superconductivity and linear colliders. Following on from the CARE project, the 37 partners of EuCARD gather together expertise to advance European particle research and upgrade its accelerator infrastructures.*

### **An access card for networking and accelerator facilities**

Accelerators are large and complex instruments. By combining the competences of many experts, this complexity can gradually be mastered. The EuCARD networks for science and communication offer common platforms where scientists and engineers from different fields can exchange their experience, confront their results, experiment new ideas and organize their collaborations. The networks focus on facilities for neutrino physics, accelerator and collider performance and radio frequency technologies, as well as dissemination and outreach. In the same spirit of exchange, two new facilities, MICE, a muon particle storage ring and HighRadMat, a test station for a pulsing particle beam, are open to other scientific and technical communities as part of the EU's support of transnational access.

### **Accelerating new and emerging technologies**

The fundamental ingredients of accelerator sciences are the abilities to guide, focus and accelerate particles. Once these foundations are established, a range of issues govern the performance level that can be achieved. At present, these fundamental ingredients are limited by the existing technologies, provoking active, world-wide research and development.

To guide and focus the high-energy particle beams requires magnets with large magnetic fields that are only achievable with superconductors. The superconductor currently in use limits the magnetic field to 10 Tesla. EuCARD will test the suitability of a different material: Nb<sub>3</sub>Sn, that should bring the field to 13 to 15 Tesla, supplemented by High-Temperature superconducting inserts that might boost it to 20 Tesla. These superconductors are brittle and represent real technological challenges to meet the extreme requirements of accelerator magnets.

As particle beams increase in power and intensity, the collimators responsible for the protection of the machine must become more efficient and robust. EuCARD will design and construct prototypes using a range of materials to meet these new requirements.

It is generally agreed that the next generation of particle accelerators will be electron linear accelerators. They largely reduce the energy loss inherent to bending charged particles. However issues such as beam acceleration and stabilization need to be investigated, for both the superconducting acceleration technology and an original normal-conducting two-beam acceleration principle. EuCARD will contribute to this research, benefitting from synergies with world-wide networks of experts

EuCARD shall also assess novel accelerator concepts, contributing to new possibilities for a large range of accelerators.

## **EuCARD in summary**

**Project acronym:** EuCARD

**Funding scheme (FP7):** Combination of Collaborative Project and Coordination and Support Action

**EU financial contribution:** €10 million

**EU project officer:** Hugues Crutzen, hugues.cruzen@ec.europa.eu

**Duration:** 48 months

**Start date:** 1 April 2009

**Completion date:** 31 March 2013

**Project webpage:** <http://www.cern.ch/EuCARD/>

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### **Partners:**

European Organization for Nuclear Research (CH)

Austrian Research Centers GmbH (AT), Helmholtz-Zentrum Berlin für Materialien und Energie GmbH (DE), Budker Institute of Nuclear Physics (RU), Commissariat à l'Énergie Atomique (FR), Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (ES), Centre National de la Recherche Scientifique (FR), Columbus Superconductors SpA (IT), Instituto de Física Corpuscular (Consejo Superior de Investigaciones Científicas – Universitat de València) (ES), Deutsches Elektronen-Synchrotron (DE), Bruker HTS GmbH (DE), Ecole Polytechnique Fédérale de Lausanne (CH), Forschungszentrum Dresden-Rossendorf e.V. (DE), Forschungszentrum Karlsruhe GmbH (DE), Gesellschaft für Schwerionenforschung GmbH (DE), The Henryk Niewodniczanski Institute of Nuclear Physics Polish Academy of Sciences (PL), Istituto Nazionale di Fisica Nucleare (IT), The Andrzej Soltan Institute for Nuclear Studies in

Swierk (PL), Politecnico di Torino (IT), Paul Scherrer Institut Villigen (CH), Politechnika Wroclawska (PL), Royal Holloway University of London (UK), Russian Research Center 'Kurchatov Institute' (RU), University of Southampton (UK), Science and Technology Facilities Council (UK), Technical University of Lodz (PL), Tampere University of Technology (FI), Helsingin Yliopisto (University of Helsinki) (FI), Université Joseph Fourier Grenoble (FR), University of Lancaster - Cockcroft Institute (UK), University of Malta (MT), Université de Genève (CH), University of Manchester - Cockcroft Institute (UK), The Chancellor, Masters and Scholars of the University of Oxford (UK), Universität Rostock (DE), Uppsala Universitet (SE), Politechnika Warszawska (PL)