

Image: GSI Helmholtzzentrum für Schwerionenforschung GmbH, J. Mai



Enhanced European Coordination for Accelerator Research & Development

Is there only one Higgs boson? What is dark matter? The Large Hadron Collider (LHC), the world's largest and most powerful accelerator today, contributed to increasing our understanding of the universe; although many fascinating mysteries are still to be unveiled. Acting like giant microscopes, particle accelerators are unique instruments to observe the basic constituents of nature (matter, forces and energy), and at the same time are our only way of interacting with the inner components of matter. In addition to a variety of scientific accelerators, more than 20,000 industrial and medical accelerators contribute to improving our daily life in fields such as medical imaging, cancer therapy, material science or security. With such a wealth of scientific and technical fields relying on accelerator technology, the European scientific community has selected common priority areas of research and development (R&D) to prepare the next generation of particle accelerators. Following on from the EuCARD project, EUCARD-2 brings together a community of 40 partners from academia, research institutes and industry to achieve a common goal: to develop particle accelerators of the 21st century. The project gives the opportunity for a new generation of scientists to be trained in an advanced technological and international environment. EuCARD-2 will explore ways to develop smaller, more powerful, efficient and smarter accelerators for the benefit of both science and society.

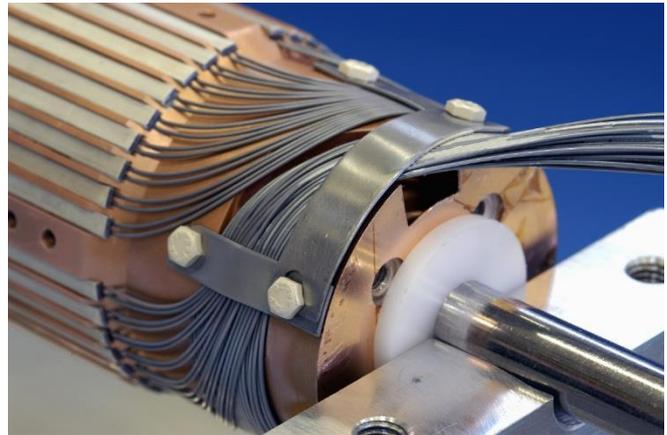
● ACCELERATING NEW AND EMERGING TECHNOLOGIES

Accelerators need to break the frontiers of present technologies to extend their reach in terms of energy, intensity, efficiency and technology. EuCARD-2 aims to go well beyond the state of the art, promoting a world-wide R&D that could lead to groundbreaking upgrades of existing accelerator infrastructures. This, in turn, will reinforce Europe's leading position at the forefront of particle physics and accelerator technology.

At the energy frontier, EuCARD-2 will contribute to the development of superconducting magnets reaching exceptional magnetic fields and of new compact and efficient accelerating systems. These developments will allow the construction of accelerators with energy well beyond that of the LHC while staying compact in size.

At the intensity frontier, particle beams of extreme densities will be analysed together with innovative materials that are required to protect the accelerator from the huge energy contained in the beam.

At the efficiency frontier, technical solutions will be investigated to reduce the energy consumption and overall cost of accelerators. EuCARD-2 will analyse and



A close-up of the lower part of a 13kA current lead. Credit: CERN

compare novel technologies that can allow accelerators to grow while remaining sustainable.

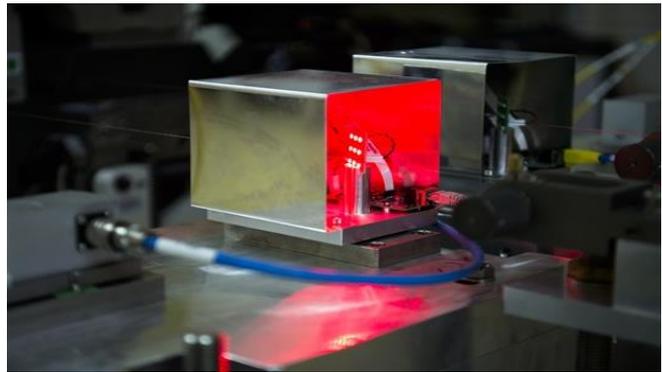
At the technology frontier, EuCARD-2 will assess novel accelerator concepts based on lasers and plasma, contributing to the development of an alternative to conventional acceleration technologies that could open a wide range of possibilities for different types of accelerators.



● AN ACCESS CARD FOR NETWORKING AND ACCELERATOR FACILITIES

The complex challenges that accelerators face are often at the cross-road of several technologies. By bringing together experts from different communities, EuCARD-2 fosters a multi-disciplinary approach that catalyses innovative solutions. The EuCARD-2 networks offer platforms where scientists and engineers from different fields can exchange their experience, define common strategies and identify potential applications. The networking activities focus on technology transfer, energy efficiency, applications, high-performance accelerators and high-quality beams, and emerging technologies. In the same spirit of exchange, three unique facilities, ICTF, a high precision beam line, HiRadMat, a test station for a pulsing particle beam and SM18, a test station for magnets, are open to other

scientific and technical communities as part of the EU's support of transnational access.



CLIC accelerator modules under construction at CERN. Credit: CERN



NAME: Enhanced European Coordination for Accelerator Research & Development

ACRONYM: EuCARD-2

DURATION: 48 months

PROJECT PAGE: <http://cern.ch/EuCARD2>

START DATE: 1 May 2013

COORDINATOR: Maurizio Vretenar, CERN

END DATE: 30 April 2017

FUNDING SCHEME (FP7): Integrating Activities (IA)

BUDGET: € 23.4 million

EU FINANCIAL CONTRIBUTION: € 8 million

Accelerator laboratories

European Organization for Nuclear Research (CH)
Commissariat à l'Énergie Atomique (FR)
Centre National de la Recherche Scientifique (FR)
Deutsches Elektronen-Synchrotron (DE)
Istituto Nazionale di Fisica Nucleare (IT)
Science and Technology Facilities Council (UK)
Paul Scherrer Institut (CH)
Société civile Synchrotron SOLEIL (FR)
GSI Helmholtzzentrum für Schwerionenforschung GmbH (DE)
European Spallation Source ESS AB (SE)

Technology institutes / Universities

University of Malta (MT)
Université de Genève (CH)
University of Manchester (UK)
University of Oxford (UK)
Universität Rostock (DE)
Uppsala Universitet (SE)
Politechnika Warszawska (PL)
University of Southampton (UK)
Lancaster University (UK)
Politecnico di Torino (IT)

Instituto de Fisica Corpuscular (Consejo Superior de Investigaciones Cientificas) (ES)
Tampere University of Technology (FI)
Royal Holloway University of London (UK)
Universitat fur Musik und darstellende Kunst Graz (AT)
Teknologisk Institut (DK)
Institute Polytechnique de Grenoble (FR)
Heinrich-Heine-Universitaet Dusseldorf (DE)
Johannes Gutenberg Universitaet Mainz (DE)
Karlsruher Institut für Technologie (DE)
Universiteit Twente (NL)
The University of Huddersfield (UK)
University of Strathclyde (UK)
University College London (UK)

Scientific institutes

Russian Research Centre 'Kurchatov Institute' (RU)
Helmholtz-Zentrum Berlin für Materialien und Energie GmbH (DE)
Helmholtz-Zentrum Dresden-Rossendorf EV (DE)
Lunds Universitet (SE)
Narodowe Centrum Badań Jądrowych (PL)

Industry partners

Bruker HTS GmbH (DE)
RHP-Technology GMBH & CO KG (AT)

