

Project No.: 19003 Core Institution in Japan.: Osaka University
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**JSPS Core-to-Core Program -Strategic Research Networks-
FY2010 Research Report**

Project No.	19003
Research Theme	High Energy Density Science
Duration of Project	April 1st, 2009 – March 31, 2012 (36 months)
Core Institution in Japan	Osaka University

Implementing Organizations

Country	Japan
Core Institution	Osaka University
Co-Chair (name and title)	Graduate School of Engineering, Osaka University • Professor • Ryosuke Kodama
Number of Cooperating Institutions	24
Cooperating Institutions	Japan Atomic Energy Agency Utsunomiya University, Univ. of Electro- Communications Tokyo University Tokyo Institute of Technology Kyoto University Nagoya University National Institute for Fusion Science Yokohama National University National Institute of Advanced Industrial Science and Technology Aoyama Gakuin University, Setsunan University Tohoku University The Graduate School for the Creation of New Photonics Industries Hiroshima University Chitose Institute of Science and Technology Central Research Institute of Electric Power Industry High Energy Accelerator Research Organization Kumamoto University Japan Aerospace Exploration Agency Okayama University Kyushu University Institute for Laser Technology RIKEN

Country	U.K.
Core Institution	Rutherford Appleton Laboratory
Co-Chair (name and title)	Central Laser Facility • Professor • Peter Norreys
Number of Cooperating Institutions	6
Cooperating Institutions	Imperial College London University of Oxford University of York Queen's University Belfast University of Strathclyde University of Essex
Matching Fund	Science and Technology Facilities Council (STFC) • Photon Science Department Program

Country	France
Core Institution	Ecole Polytechnique (CNRS)
Co-Chair (name and title)	Laboratoire pour l'Utilisation des Lasers Intenses (LULI) · Senior Scientist · Michel Koenig
Number of Cooperating Institutions	7
Cooperating Institutions	Universite Pierre et Marie Curie Commissariat Energie Atomique CEA/DAM Ile-De-France, Bru'eres-le-Chatel Observatoire de Paris-Meudon Laboratoire pour l'Application des Lasers de Puissance (CNRS) ENSMA
Matching Fund	①CNRS·LULI ②CNRS·PICS

Country	U.S.
Core Institution	University of California San Diego
Co-Chair (name and title)	Engineering science · Associate Professor · Farhat Beg
Number of Cooperating Institutions	13
Cooperating Institutions	Ohaio State University Princeton University University of Texas, Austin Lawrence Berkeley National Laboratory Lawrence Livermore National Laboratory Sandia National Laboratory University of Michigan Rice University University of Rochester University of Nevada, Reno University of California, San Diego General Atomics Purdue University
Matching Fund	①DOE OFES · Fast Ignition ②National Science Foundation · US·Japan Collaboration

Result of Program Implementation

Under the project “International Collaboration for High Energy Density Science (ICHEDS)” supported by JSPS Core-to-Core Program, we have strategically explored the high energy density sciences. The expeditions were made by applying focused and cross-sectional approaches to the following five categories: a) Relativistic Plasma Physics, b) High Pressure Condensed Matter, c) Warm Dense Matter, d) Laboratory Astro Physics, e) Plasma Photonics. Joint researches have been made by using high-power laser facilities all over the world under this program. The ICHEDS has played a role of one of “the global core centers” in the area of high energy density science, powered by virtual center capabilities to exchange related information and form a network of the next-generation researchers.

Achievements in FY2010 (Self Review)

In 2010 FY, we have sent a total of 80 scientists and students abroad in the Strategic Research Network Project.

Joint experiments on 1)relativistic plasma, 2)high pressure condensed matter, 3)warm dense matter, 4) laboratory astrophysics and 5) plasma photonics have been carried out by using high-power laser facilities at Osaka University in Japan, Rutherford Appleton Laboratory in UK, Ecole Polytechnique LULI in France, University of Rochester, Lawrence Livermore National Laboratory and University of Michigan in US. More than 25 journal papers such as Nature Physics have been published as its result.

As for Seminar, one workshop was held in Japan(October, 2010, Wakayama) and others in UK(January, 2011, Edinburgh), in France(January, 2011, Les Houches)and in US(November, 2010, Las Vegas).

Besides workshop with UK and France, "The 2nd Japan-UK Winter School on High Energy Density Science", "The 3rd Japan-France Winter School on High Energy Density Science" was held to promote fostering of young researchers and student. Two workshops and winter schools were close to each other on the schedule, resulting in the efficient and economical advantages on the arrangement. Consequently, a larger number of young scientists and graduate students could join to the workshops and winterschools.

By using support for young scientists, summer school on high energy density sciences was held in Japan under the planning and management mainly by students (August, 2010, Wakayama). This events must have been effective for graduate students to be young scientists having an international leadership.

Future Plan (Measures toward Achieving Research Objectives)

In this project on high energy density sciences under the core to core program, we have successfully achieved joint researches and seminars with UK, France and US as a bilateral cooperation. Now we are continuing this high level of activities with UK, France and US as a multilateral cooperation in the framework of the Strategic Research Network Project. Joint experiments on Laboratory astrophysics, high pressure condensed matter and plasma photonics have been especially carried out with Japan-UK-France as a multilateral cooperation. We would like to promote these multilateral collaborations including US and to other fields.

Joint workshops are now established as regular meetings with UK, France and US. We will hold Japan-UK-US-France Joint symposium to summarize our results obtained during this program. We will also have a winter school lectured by scientists from 4 countries.