

JSPS Core-to-Core Program
FY2012 Implementation Plan (Project No. :22001)

Research Theme Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas
Duration of Project from April 1, 2012 to March 31, 2015 (36months)
Core Institution in Japan (Co-Chair) Graduate School of Frontier Sciences, University of Tokyo
(Yasushi Ono)

Implementing Organizations

○ **Japan**

Japan	Core Institution	Graduate School of Frontier Sciences, University of Tokyo	
	Co-Chair (name and title)	ONO Yasushi, Professor	
	Cooperating Institutions	Advanced Institute of Science and Technology Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency National Astronomical Observatory Japan National Institute for Fusion Science Kyoto University	Number of Cooperating Institutions 5

○ **Partner Countries**

	Core Institution	Princeton Plasma Physics Laboratory, Princeton University	
	Co-Chair (name and title)	JI Hantao, Principal Research Physicist	
	Cooperating Institutions	University of Wisconsin University of Washington University of Chicago Swarthmore College University of New Hampshire University of Alabama Stanford University George Mason University University of California, Los Angeles	Number of Cooperating Institutions 9

	Core Institution	Padova University	
	Co-Chair (name and title)	MARTIN Piero, Professor	

	Cooperating Institutions		Number of Cooperating Institutions
			0

	Core Institution	Culham Laboratory	
	Co-Chair (name and title)	GRYAZNEVICH Mikhail, Principal Research Physicist	
	Cooperating Institutions	University of London	Number of Cooperating Institutions
1			

	Core Institution	Max-Planck Institute for Solar System Research	
	Co-Chair (name and title)	SOLANKI Sami K., Director	
	Cooperating Institutions		Number of Cooperating Institutions
0			

	Core Institution	Astrophysical Institute of Canary Islands	
	Co-Chair (name and title)	BUENO Javier Trujillo, Director	
	Cooperating Institutions		Number of Cooperating Institutions
0			

Objectives of Research Exchange (including the five years after the project finishes)

We started the international joint COE program for magnetic reconnection/ self-organization based on the past ten years' progress in laboratory merging experiments and their broad collaborations. Its emphasis is on international and interdisciplinary collaborations among laboratory experiments, observations and theories/ simulations of Japan, US, UK, Italy, Germany and Spain to solve their key physics such as a significant reconnection heating and active control of self-organization by beam injection. Our goal is to complete an interdisciplinary and international research field of magnetic reconnection/ self-organization for elucidating their physics using joint-researches, exchanges and education of young scientists.

Results to the present

The international core-to-core program among laboratory experiments, observations and theories/ simulations has solved important key physics of magnetic reconnection and self-organization: 1) reconnection heating/ acceleration, 2) fast reconnection mechanism, 3) plasmoid reconnection, 4) active control of self-organization etc. For example, a significant reconnection heating over 1keV was studied by Japan-UK collaboration and was further investigated in collaboration with solar satellite observations and various MHD/ particle simulations. Our project published more than 100 journal and conference papers including a number of invited talks. Our three core meetings: MR, IPELS and Hinode now became top quality conferences in the fields of reconnection, self-organization and solar physics, respectively, leading us to publish the special issue of MR conference in an AIP journal: Physics of Plasmas. We successfully started the "free-style study abroad" project that enables young scientists to study abroad at the best place and time for them in our joint projects.

Summary of FY 2012 Exchange Plan

Joint Research

Joint magnetic reconnection experiment with neutral beam injection at TS-4 and UTST (Univ. Tokyo)

Joint magnetic reconnection experiment for anomalous resistivity at MRX (Princeton Univ.)

Joint reconnection heating experiment under high-Reynolds number at MAST (Culham Lab.)

Joint magnetic self-organization experiments with neutral beam injection at MST (Wisconsin Univ.) and RFX (Padova Univ.)

Joint theory/ experiment collaborative research at Wisconsin Univ.

Joint solar observation/ experiment collaborative research at London Univ., Astrophys. Inst. Canary Islands

Joint solar observation/ experiment collaborative research at Max-Planck Inst.

Seminar

MR2012 (Magnetic Reconnection in Space and Laboratory Plasmas) Conference (May, 2012)

Joint Workshops for Solar Observation and Laboratory Experiment (Jun., Nov, 2012, Mar. 2013)

Hinode 6 Conference (Aug., 2012)

Researcher Exchanges

Plenary talk at EPS/ICPP 2012 conference

Invited talks at COSPAR 2012 conference

Invited talk at European Geophysical Union conference

Tutorial talk at Materials Research Society, 2012 Spring Meeting