

## 4. Japan-China Collaboration for Fusion Research (Post-CUP Collaboration)

### I. Post-CUP collaboration

The international collaboration program named "JSPS-CAS Core-University Program (CUP) on Plasma and Nuclear Fusion (CUP collaboration)" was finished at FY 2010 after 10 years collaborative research between Japan and China, which was supported by the Japan Society for the Promotion of Science (JSPS) on the Japanese side and by the Chinese Academy of Science (CAS) on the Chinese side. As an extension of the CUP collaboration a new Japan-China collaboration for fusion research has been started from FY2011 as Post-CUP collaboration. The Post-CUP collaboration is directly supported by National Institute for Fusion Science (NIFS) on the Japanese side and by Institute of Plasma Physics, Chinese Academy of Science (ASIPP) on the Chinese side. The both institutes assist the collaborations between all participating institutes and universities in Japan and China as well as the CUP collaboration. The Post-CUP collaboration consists of four major research categories as follows;

- Category I: Experiment
- Category II: PWI (IIa) and A&M (IIb)
- Category III: Theory
- Category IV: Fusion engineering

The category I includes diagnostics and heating in addition to the experiment. The categories of I and II are organized as collaborative research directly connected to torus plasma experiments. The study on PWI in the category II can be extended to the edge plasma study. The category III includes computer simulation to analyze the experimental results and to support the experiments. The category IV includes researches on reactor materials, blanket and superconducting magnet.

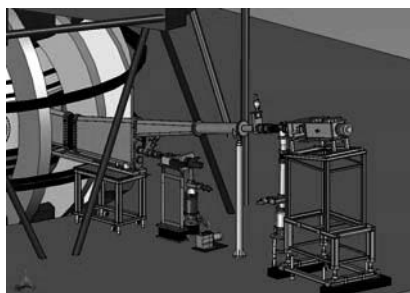


Fig.1 VUV and EUV spectrometers installed on HL-2A for collaboration on impurity transport and A&M

### II. General review on collaboration in FY 2011

In the categories I and IIa, collaborative researches were mainly carried out in two major tokamaks, EAST (ASIPP) and HL-2A (SWIP) in China, and in LHD (NIFS) and QUEST (Kyushu Univ.) in Japan. The researches studied on impurity transport at plasma edges in scrap-off layer and stochastic magnetic field layer (see Fig.1), Edge Localized Mode (ELM) mitigation using Resonant Magnetic Perturbation (RMP) coil, MHD instability excited by supra-thermal electrons and fast ions and MHD equilibrium in the steady state and high-beta plasmas (see Fig.2) in addition to Plasma Wall Interaction (PWI) performed with material samples tested in fusion plasmas. Various atomic and molecular processes in high and low temperature plasmas were studied as collaborative researches for basic understanding of atomic/molecular physics and applications to fusion plasmas including theoretical works.

In category III, theoretical works were focused on global instabilities in tokamak discharges in addition to the interaction between MHD instabilities and micro turbulence including Geodesic Acoustic Mode (GAM). Turbulent transport was also theoretically investigated in multi-scale plasmas. Simulation study on SOL-divertor modeling was applied to EAST and HL-2A tokamak discharges and physical mechanism of dust formation in such fusion plasmas was studied.

In category IV, materials for blankets and plasma facing components and tritium behaviors in a material were investigated for realistic design of an advanced fusion reactor. Cryogenic stability of advanced superconductors were also studied.

The collaboration programs implemented in FY2011 are summarized in Table 1 for each research category.



Fig.2 Neutron detector installed on EAST for collaboration on high-energy particle and MHD studies

Table 1 Statistical Summary of Post-CUP collaboration in FY2011

Research Topics		J→C person (person-day)	C→J person (per.-day)	Total person (per.-day)
I	Experiment	11 (89)	6 (77)	17 (166)
II	PWI and A&M	9 (54)	2 (55)	11 (109)
III	Theory	3 (28)	0 (0)	3 (28)
IV	Fusion engineering	3 (13)	2 (28)	5 (41)

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