

11. Research Enhancement Strategy Office

The Research Enhancement Strategy Office (RESO) was founded in October 2013, and three University Research Administrators (URAs) were assigned for the purpose of

- (1) encouraging collaborative research
- (2) supporting young researchers
- (3) enhancing public relations.

In order to assist the URAs, three Task Groups were organized in the RESO, which consist of a manager, a URA and a few senior researchers.

(1) The collaborative research activities of RESO works in FY2016 are summarized as follows.

- 1) Enhancing international collaborative research in the stellarator-heliotron (S-H) plasma, and steady-state operation (SSO) toward a fusion reactor

Helical plasma experiment using Wendelstein 7-X (W7-X) device, which is promoted by Max Planck Institute of Plasma Physics (IPP) at Greifswald in Germany, was started 10, Dec 2015. Several young scientists in NIFS were assigned to IPP to initiate international collaboration research using W7-X. In order to accelerate the collaboration some annexes to the NIFS-IPP Agreements were established in various collaborative researches.

Collaborative researches were also performed in PPPL in USA, CIEMAT in Spain, CEA in France, CONSORZIO RFX in Italy and Culham Centre in UK.

- 2) International research network for integrated plasma physics

NINS plans to organize the international research networks with Princeton University and Max-Planck Research Institutes for the integrated plasma physics. The scope of research program includes fusion plasma physics, space plasma physics and astronomical plasma physics.

In July 2016, NINS made an MoU with Princeton University for the international collaborations within this integrated plasma physics framework, namely NPC program (NINS Princeton Collaboration).

On the other hand, the discussions for the collaboration framework between NINS and Max-Planck institutes were continued for making MoU. Three institutes in the Max-Planck society are involved in the program, namely Max-Planck Institute for Plasma Physics (IPP), Max-Planck Institute for Astrophysics (MPA) and Max-Planck Institute for Solar System Research (MPS).

- 3) Promoting establishment of Agreements with Asian institutes to accelerate collaborative research

In order to enhance helical and stellarator research in Asian countries, NIFS concluded general agreements with Faculty of Science in Chiang Mai university in Thailand and with the Thailand institute of nuclear technology (TINT) in 2016. Figure 1 shows a picture of a signing ceremony between NIFS and TINT. This is expected to be an opportunity to extend fusion research using helical devices in Asia.

- 4) Supporting unexplored fields of plasma physics associated with plasma research in NIFS.

The RESO have been exploring new research fields in which researcher in NIFS can join, and supporting bio-plasma research as one of the new plasma research fields. In FY 2016, a comparison was carried out for the growth of white radish sprouts with or without plasma irradiation treatment in atmospheric pressure.



Fig. 1 A signing ceremony between NIFS and TINT.

(2) In the activity of supporting young researchers, international collaboration activities of young researchers were encouraged enforcing their basic research skills. Based on the budget given by NINS for the enhancement of the institutional research activities, RESO supported the international collaboration plans proposed by young researchers in NIFS. Applications were reviewed by the task group for the enhancement of young researchers' activities. Four programs were supported in FY2016 which are listed as follows.

- 1) Development of two dimensional microwave imaging diagnostics with ECE emissions for plasma turbulence study.
- 2) Study of impurity transport in stellarators using the tracer encapsulated pellet injection.
- 3) Development of fusion reactor modeling by comparing various system codes in the world.
- 4) Simulation study of EGAM phenomena in toroidal plasmas for different conditions of experimental devices.

In addition to the international collaboration program explained above, RESO supported the basic research plans of young scientist for the purpose of enhancing their fundamental scientific skill.

(3) For enhancing public relations, the following activities were conducted primarily by RESO.

- 1) Dissemination of research achievements through EurekAlert!

Nine topics were released as follows. i) "The Discovery of New Emission Lines from Highly Charged Heavy Ions", ii) "Clarifying the Fusion Plasma Confinement Improvement Mechanism", iii) "Large Volumes of Data from ITER Successfully Transferred to Japan at Unprecedented Speeds", iv) "Establishing an Advanced Bonding Technique for Tungsten and Copper Alloys", v) "First Observations in the World of Tongue Deformation of Plasma Based upon the Artsimovich Prediction", vi) "Clarifying the Plasma Oscillation by High-energy Particles", vii) "The Fusion Reactor that Employs a Liquid Metal Shower", viii) "Clarifying the Behaviors of Negative Hydrogen Ions", ix) "Calculating One Billion Plasma Particles in a Supercomputer".

These topics were released to the media in Japan, too. Some topics attracted attention from international media.

- 2) Improvement of Web page for foreign researchers

The Web page in English was enriched by uploading "Research Update" for dissemination of research activities to readers overseas. "Research Update" is issued every three weeks. English translation of guides on open recruitment of collaborative research in Japanese was upgraded.

- 3) Outreach activities based on fusion community

URA of RESO is cooperating with the outreach of fusion research. RESO joined Fusion Energy Forum, which is managed by QST and NIFS. One of activities is holding the annual meeting for reporting and discussing ITER/BA achievements.

- 4) Others

RESO exhibited NIFS research activities on several occasions, one of which is shown in Figure 2. For dissemination of NIFS activities brochures in Japanese and in English are edited annually. URA and an English native staff checked the proofs of the manuscript. RESO held science café at the Open House and supported exhibitions at the Fusion Festa in Tokyo.



Fig. 2 Exhibition of NIFS panels at the Nobeyama Radio Observatory in August 2016.

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