Division of Transdisciplinary Sciences

Department of Advanced Energy

Laboratory	Faculty	Introduction of research activities and laboratory	Key words	Projects or activities summer program students can participate
Yasushi Ono	Prof. Yasushi ONO	Our main research fields are Plasma Physics and Engineering,	Plasma Experiment;	We, international plasma research groups propose annual
Laboratory	Assist. Prof. Hiroshi	especially development of fusion energy, alternative energy sources, space	Fusion Energy;	interdisciplinary schools and workshops of plasma astrophysics
	TANABE	and solar plasmas and plasma applications. The present fusion research	Spherical Tokamak	based on bidirectional exchanges of research staffs, graduate
		already realized fusion power output larger than the input power as an	(ST); Field-Reversed	and undergraduate students. This new approach focuses on
		exhaustless energy without any global warming gas. Its key question is	Configuration (FRC);	interrelationship of laboratory plasma experiments, space/
		whether we can develop economic ultra-high-b confinement uaing	Magnetic Self-	astrophysical plasma observations and numerical/ theoretical
		economic high-power heating, where the beta is the plasma thermal	Organization	plasma studies and their applications based on the international
		pressure P confined by the unit magnetic field: $b=P/(B2/2\mu 0)$. We have		and interdisciplinary collaborations. Our annual school and
		developed a number of new ideas for (1) high-b confinements: Spherical		workshop will be held in Tokyo area for graduate and
		Tokamak (ST) and Field-Reversed Configuration (FRC) and (2) high-power		undergraduate students. Mutual visits of faculty members and
		heating: merging/ reconnection heating, using the TS-3, TS-4, UTST and		graduate and undergraduate students will be encouraged and
		MAST devices (based on UK-Japan collaboration). Since the magnetic		realized. Our initiative will provide a new interdisciplinary and
		field-line reconnections converts magnetic energy into plasma kinetic/		balanced education of plasma astrophysics in both the
		thermal energy, our TS-3 and MAST experiments documented significant		undergraduate and the graduate schools. This program involves
		ion heating over 0.25keV and 1keV, respectively. We found the new scaling		laboratory experiments, space observations and numerical /
		law of reconnection heating energy proportional to Brec2, indicating that the		theoretical studies of plasma astrophysics. Our activities will
		high-B rec ST merging will heat ions to the burning plasma regime without		generate a joint consortium of departments of advanced energy,
		using any additional heating facility. This fact leads us to new high-		complexity, space-astrophysical science, physics and electrical
		magnetic field ST merging/ reconnection experiments TS-U with Brec > 0.3-		engineering. We believe that our annual school and workshop
		0.5T for ion heating >1keV. We are now organizing the international world-		will provide new opportunities of international and
		wide reconnection collaboration program CMSO for physics, application of		interdisciplinary lectures, discussions and experiments to all
		merging and reconnection and also for international and interdisciplinary		plasma-course students.
		plasma education of young scientists among MRX (Princeton U.), MST		
		(Wisconsin Univ.) and MAST (Culham lab.) etc.		