

TG2 : Turbulence (+transport) Topical Group research plan

This topical group will promote research on turbulence and transport in the LHD 23rd cycle experimental campaign. More than in previous experimental cycles, we will place importance on being aware of the intervention of turbulence in various physical phenomena occurring in LHD plasmas and actively investigate the relationships among them. In particular, we will focus on the following main topics in next 23rd cycle.

Main topics:

■ Turbulence interaction in PHASE space

Novel precise diagnostics can give the phase space interaction which is a one of the unique and strong point of plasma physics. How does the structure of phase space and its distortions affect turbulence? Expecting topical physics phenomena are as follows.

- Multi-scale (high and low wavenumber turbulence) coupling
- Energy transport driven by distortion of distribution function in phase-space
- Wave-particle (high energetic particle) interaction, wavenumber broadening, etc.

■ Turbulence interaction in REAL space

LHD has wide range and high spatio-temporal resolution diagnostics. Also, LHD has several plasma control knobs such as heating and fueling tools. Combination experiment will show the cutting-edge plasma physics. Expecting topics are as follows.

- Turbulent mixing and transport in mixture plasma
- Turbulence spreading, Self organized criticality (SOC) dynamics
- Seesaw phenomenon, Teleconnection
- Turbulence and transport at around positive pressure gradient region

Prioritization:

- Experimental proposes related with “Main topics” have higher priority.
- Other turbulence-related topics are recommended to be done as piggyback experiments.

Others:

- HIBP will be operated more routinely in this TG (positive magnetic field polarity)
- Collaborate with other TGs for efficient operation of machine time. For example, turbulence in plasmas containing hydrogen, deuterium, and helium gases (including mixture plasmas), turbulence during transition phenomena such as ETB and ITB, turbulence during detachment, etc.