Overview and discussion of common LHD / W7-X experiments.

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(see list of proponents later)

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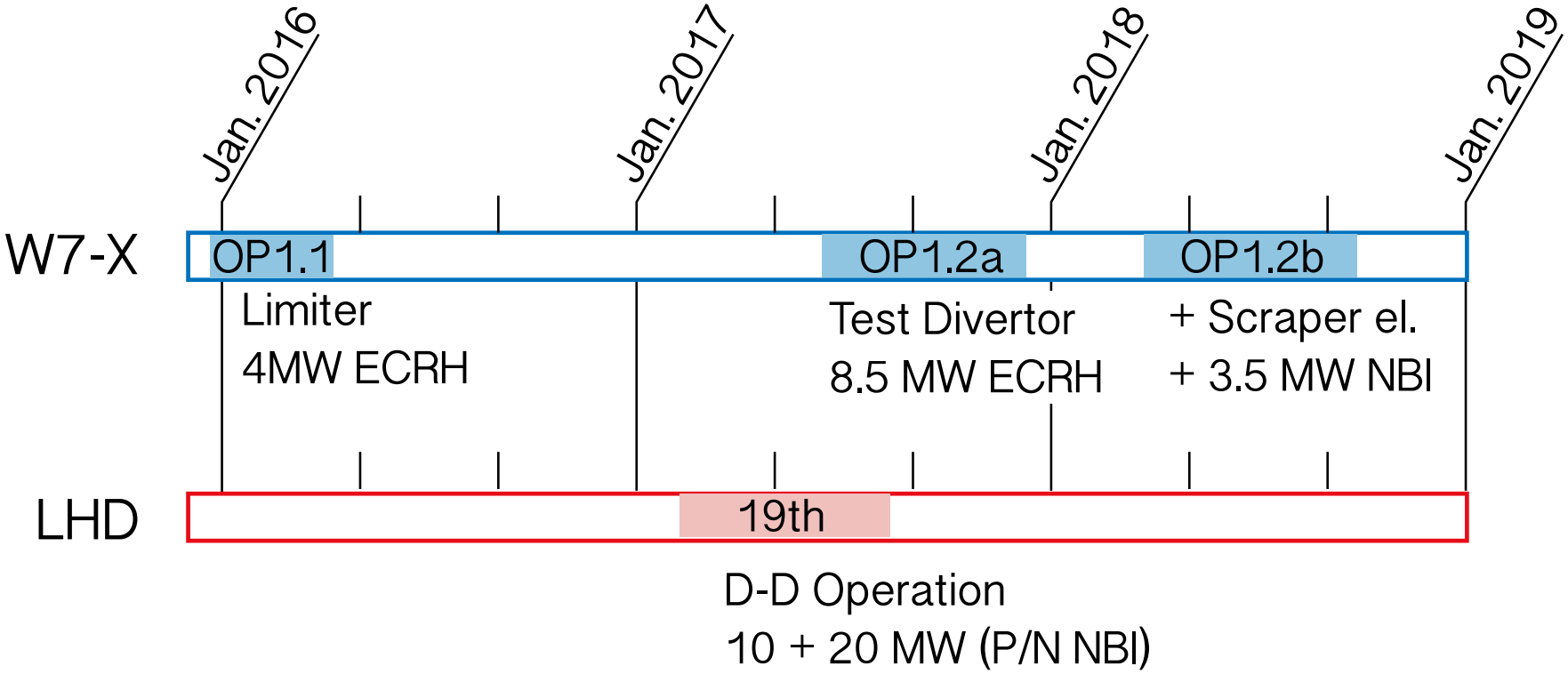
Outline

1. Introduction and purpose of this session
2. Experimental campaigns in the LHD and W7-X
   - CERC plasmas in the first operation of W7-X
3. Review of parallel experiments and analysis
4. Current planning of LHD campaign (*S. Masuzaki*)
5. Discussion

Introduction and purpose

- W7-X and LHD devices are in **crucial phases of their scientific and technical development** (D-D operation in LHD, first plasmas and first divertor operation in W7-X).
- In view of which, the **CWG** has to care for **maximising the scientific output** through coordinated experiments, analysis and modelling.
- The majority of joint activities here reviewed are only in a 'draft' stage and are sourced from
  - **EUROfusion proposals** for LHD's 19th campaign
  - (Some) **W7-X discussion groups** for OP1.2
- The purpose of this presentation is to **present the CWG with these developments** to gather input from it and **discuss the prospects** of these activities (e.g. communications in journals/conferences).

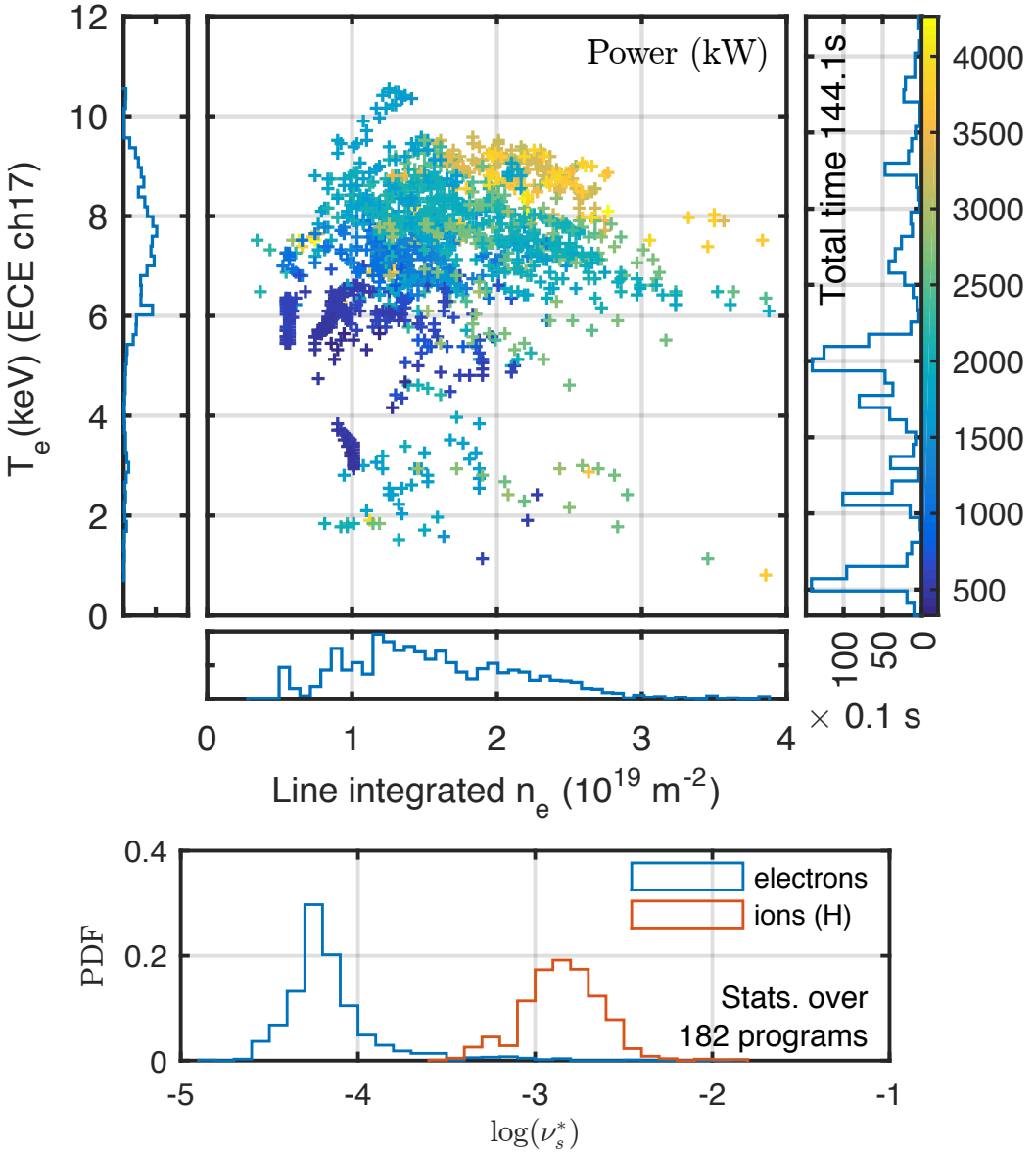
Experimental campaigns of LHD and W7-X



- W7-X: call for proposals open unit Feb. 17th. Program to be presented and discussed in the W7-X Program Workshop (Mar. 27th - 31st)

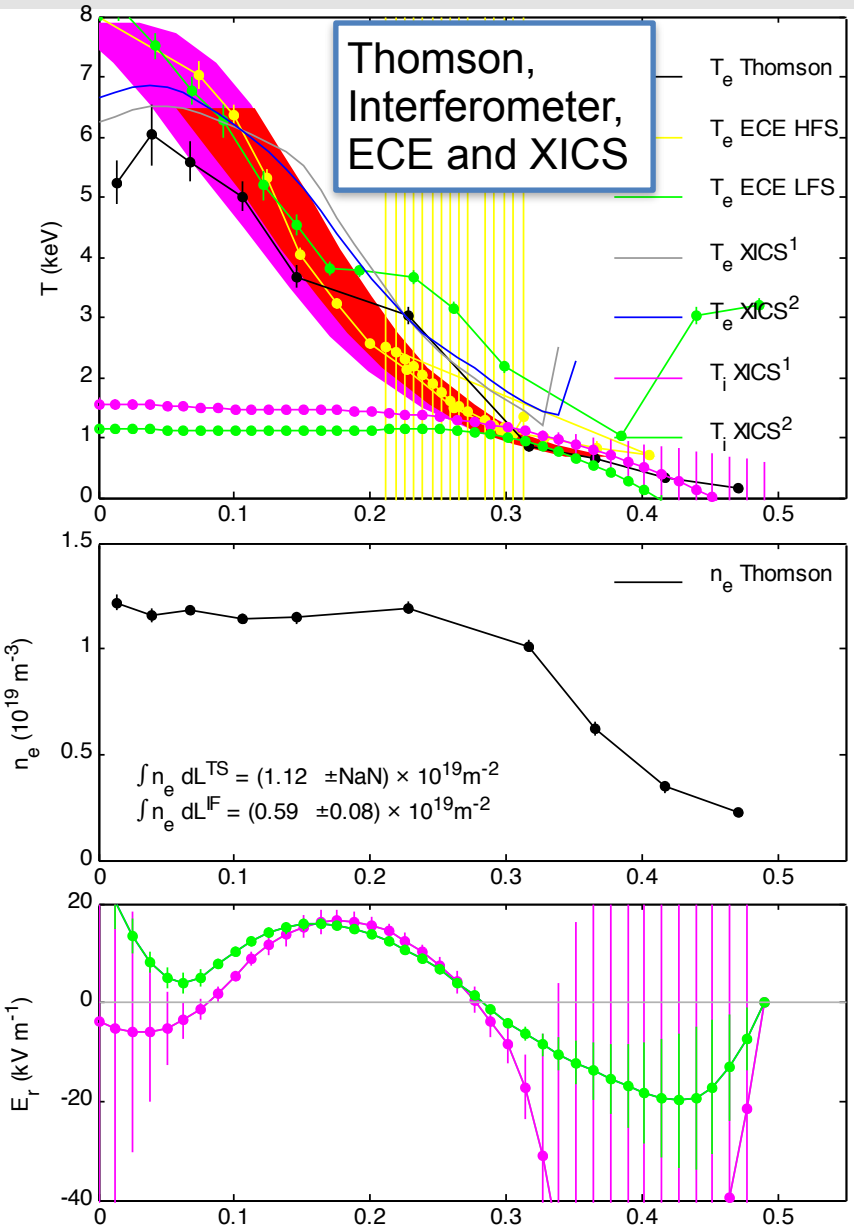
CERC plasmas in OP1.1: overview

- Low density ECRH plasmas with very low electron collisionality that feature a **positive core radial electric field.**
- Power varied from 0.5 to 4 MW —change in the extension of e-root.
- Basic transport analysis consistent with **electrons in the sqrt-nu** regime. Ions remain well separated with higher collisionality.

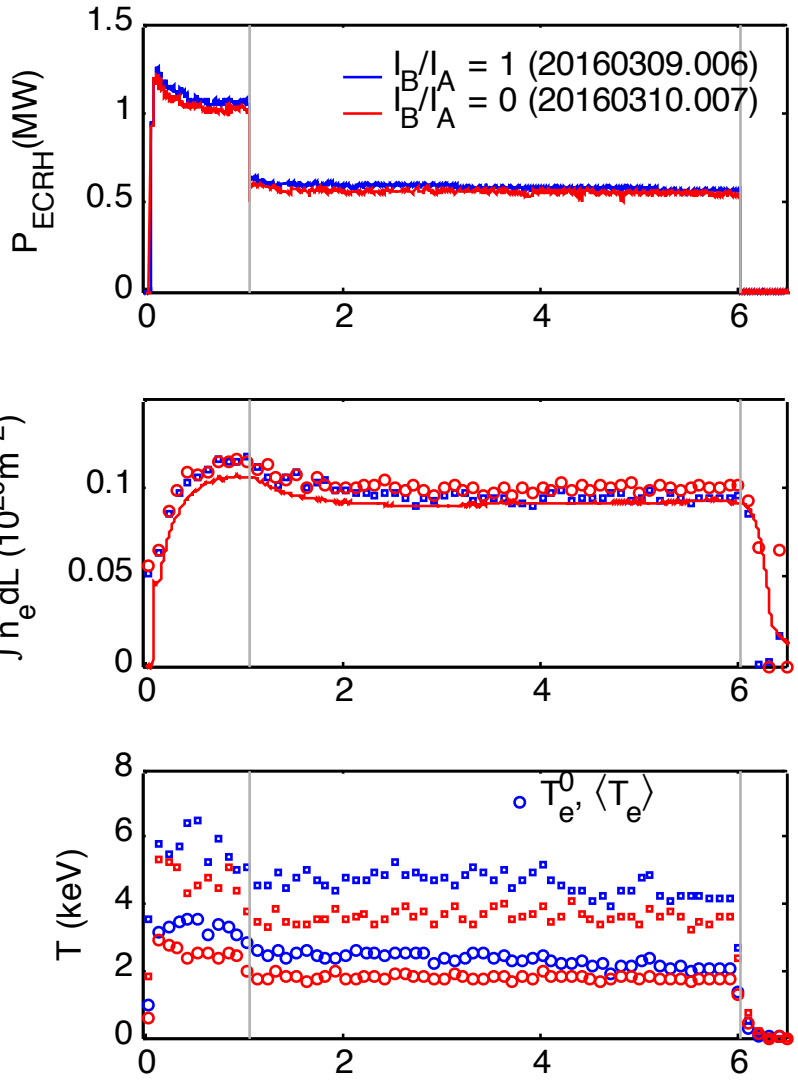


CERC plasmas in OP1.1: profiles

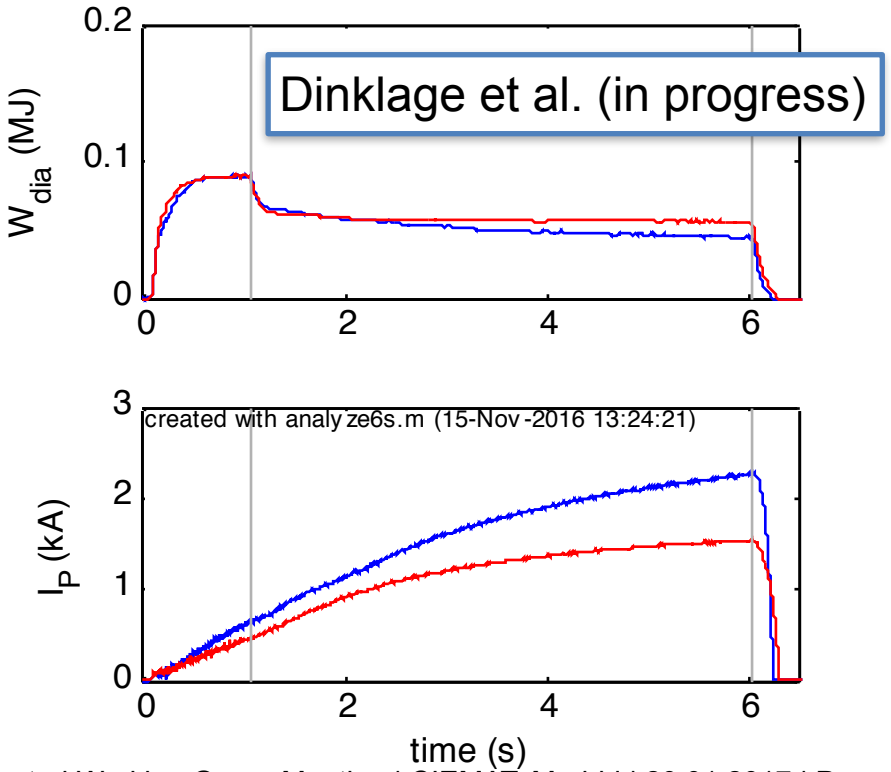
- Typical low density ECRH profiles as seen in many other helical devices.
- Evidence of **positive core electric field**: XICS (figure) and Correlation Reflectometry.
- Although not a reactor relevant regime, low densities provides **interesting conditions for testing basic physics**.
  - Flat Ti, ne core profiles.
  - Large variations in the electric field at some radial points.
  - But: CX losses important — need to diagnose particle fluxes to estimate neutral density.



CERC plasmas in OP1.1: Conf. Changes



- Good performance of OP1.1 plasmas allowed for **configuration changes.**
- Mirror term and effective ripple varied with measurable changes in e.g. toroidal current evolution.



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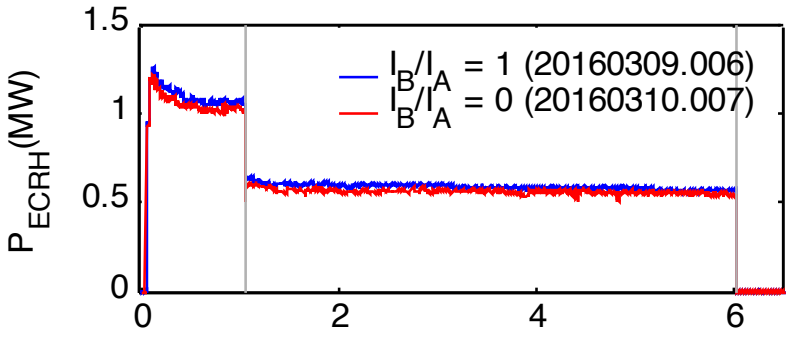

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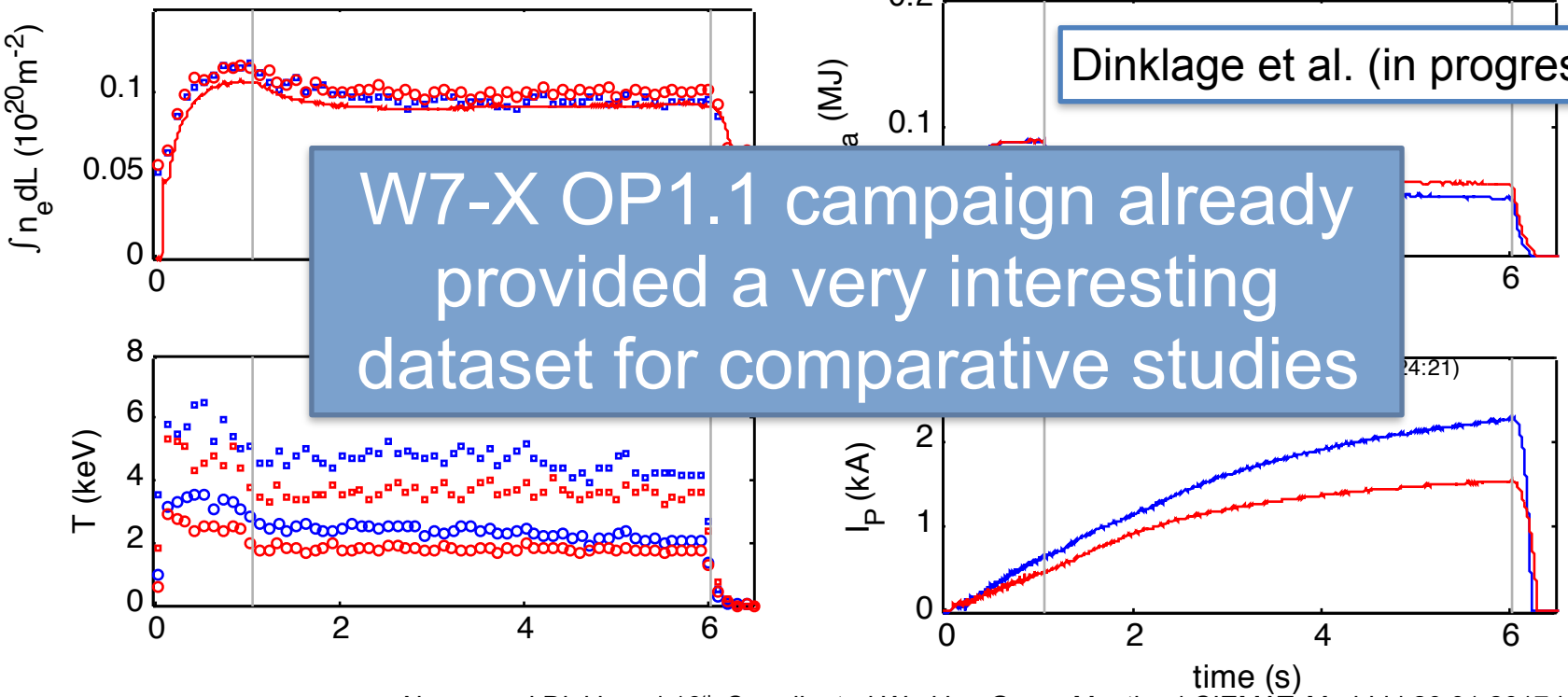
Dinklage et al. (in progress)

W7-X OP1.1 campaign already provided a very interesting dataset for comparative studies



Joint LHD / W7-X experiments under discussion

Title	Proponent and Contact	Subject	OP
Joint NIFS-IPP international collaboration on comparison of ECRH heated plasmas	Warmer (IPP/ NIFS) Yokoyama (NIFS)	Core transport /Core fuelling /Density limits	1.1
Using central ECRH heated plasmas to test basic properties of core transport in LHD and W7X.	Alonso (CIEMAT) Yokoyama (NIFS)		1.1
Conduction of pellet injection experiments	Baldzuhn (IPP) Sakamoto (NIFS)		1.2
Comparative study of soft density limit at very low ECRH power in LHD and W7-X.	Fuchert (IPP) Yokoyama (NIFS)		1.1

Joint LHD / W7-X experiments under discussion

Title	Proponent and Contact	Subject	OP
Beta effects on the 3D magnetic topology and edge plasma transport in LHD	P. Drews (FZJ) Suzuki (NIFS)	Edge magnetic topology	1.2
Impacts of 3D stochastic boundary on the distributions of heat and particle fluxes on the divertor targets in LHD	Y. Liang (FZJ) Suzuki (NIFS)		1.2
Impact of isotope effect on divertor strike line broadening in the stochastic magnetic edge of LHD.	Jakubowski (IPP) Mazusaki (NIFS)		1.2

Joint LHD / W7-X experiments under discussion

Title	Proponent and Contact	Subject	OP
Comparison of general characteristics of impurity transport in W7-X and LHD	Tamura (NIFS) Buttenschön (IPP)	Impurity transport	1.2
Moderation of neoclassical impurity accumulation in high temperature plasmas of helical devices: temperature dependence of the radial electric field.	Velasco (CIEMAT) Satake (NIFS)		1.2
Impurity transport studies in DD plasma at LHD using VUV/VIS spectroscopy.	Kubkowska (IPPLM) Tamura (NIFS)	Diagnostics /Impurity transport	1.2b
TESPEL experiments on LHD and W7-X. Impact of impurity source location.	Tamura (NIFS) McCarthy (CIEMAT)		1.2b
Tungsten spectroscopy and transport in LHD and W7-X	Suzuki (LHD) Buttenschön (IPP)		1.2
Physics of microwave scattering at LHD and W7-X	Moseev (IPP) Tanaka (NIFS)	Diagnostics	1.2

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