PEP-29 Vertical jolts/kicks for ELM triggering and control

|  |  |  |  |
| --- | --- | --- | --- |
| **TG priority:** High | **Start date:** 2011 | **Status:**  On-going | **Personnel exchange:**  No |
| **IO priority:** | **End date:** | **Motivation:** | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Device /**  **Association** | **Contact**  **Person** | **TG Request** | **Activity (from JEX/JA spreadsheet)** | | | | |
| **2012** | **2013** | **2014** | **2015** | **2016** |
| JET | E. de la Luna I. Chapman | Desirable | Committed | Committed | Committed | Analysis |  |
| F4E | M. Cavinato | Desirable |  |  |  |  |  |
| ITER | A. Loarte | Desirable |  |  |  |  |  |
| AUG | P. Lang | Desirable | Not doing | Considering | Considering | Considering |  |
| NSTX-U | J. Canik | Desirable | Not doing | Done | Done | Committed |  |
| C-Mod | J. Hughes | Desirable | Considering | Done | Done | Done |  |
| MAST | I. Chapman | Desirable | Analysis | Considering | Done |  |  |
| TCV | Y. Martin | Desirable | Committed | Committed | Not doing | Considering |  |
| COMPASS | M. Hron | Desirable |  |  |  |  |  |
| DIII-D | N. Commaux | Desirable | Considering | Not doing | Not doing | Not doing |  |
| KSTAR | J. H. Kim | Desirable | Considering | Analysis | Analysis |  |  |

**Purpose:** To improve our understanding of the physical mechanism that leads to ELM triggering using vertical jolts/kicks in order to determine whether this is a viable technique for ELM control at ITER. Vertical kicks are considered a potential scheme for W concentration control through ELM pacing in low-current H-modes in ITER.

**Results for 2015**

* No new experiments, but two modeling papers written: Gribov (ITER) using DINA code, delaLuna (JET) using CREATE-NL/JINTRAC codes. JET paper includes the analysis of the kick triggering efficiency for different plasma conditions and the role of plasma displacement vs. velocity in the ELM triggering mechanism

**Plans for 2016**

* Dedicated scans within one single device in order to explore the effect of kick parameters (size, direction and duration) and different plasma conditions on the efficiency of the ELM triggering will continue in 2016. In the near term, additional data from COMPASS and possibly NSTX-U are envisioned to contribute. In JET the proposal is to complete the existing database at higher Ip (2.5 MA).
* In addition, experiments in JET will focus on investigating the use of vertical kicks for W control in ITER relevant conditions: low input power above the H-mode power threshold and Ip ramp up/down phase. It is planned to compare the kick results with pellet pacing.
* The study of ELM pacing for W control using vertical kicks and comparison with gas fuelling and pellet pacing in D and He plasmas has been included as a high priority topic in the experiments in 2016
* There is a proposal in TCV to check if ELM pacing is possible in NBI heated discharges (type I ELMs), to decouple the effect of the amplitude, and the effect of the velocity of the vertical displacement
* Plasma response to vertical kicks using JET data (and possibly AUG data) will be performed using the JOREK code