IOS-3.3 Fast ion and thermal energy transport with elevated qmin

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| **TG priority:** High | **Start date:** 2014 | **Status:**  On-going | **Personnel exchange:**  Yes |
| **IO priority:** | **End date:** 2017 | **Motivation:** Physics Basis | |

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| **Device / Association** | **Contact Persons** | **2016 TG Request** | **Activity (from JEX/JA spreadsheet)** | | | |
| **2014** | **2015** | **2016** | **2017** |
| JET | E. Joffrin | Essential | Considering | Analysis |  |  |
| MAST | C. Challis | Desirable |  |  |  |  |
| DIII-D | J. Ferron | Desirable | Analysis | Analysis |  |  |
| AUG | TBD | Desirable | Considering | Committed |  |  |
| EAST | J. Qian | Desirable |  |  |  |  |
| KSTAR | Y. Bae | Desirable |  |  |  |  |
| NSTX-U | S. Gerhardt | Desirable |  | Upgrade |  |  |
| JT-60U | S. Ide | Desirable | Analysis | Analysis |  |  |
| EP Liaison | D. Borba |  |  |  |  |  |

**Purpose**

The viability of steady-state tokamak scenarios with elevated qmin relies on effective heating by  particles and (in ITER) NBI and ICRH to achieve high  and high bootstrap current. This requires stability to fast ion instabilities and adequate thermal confinement. Long-standing theoretical predictions of fast-ion instabilities have limited consideration of scenarios to those with q(0)<3. Recent experiments have indicated fast-ion losses due to instabilities even with qmin ~ 2. Thermal confinement at elevated qmin is also a concern with a prediction of transport scaling as q2, but mitigated somewhat by a predicted reduction of transport with low or reversed magnetic shear. Experimental assessment of thermal transport is complicated by fast-ion losses, since the dominant heating in present experiments is from sources based on fast ions. It is essential to validate models in order to interpret the consequences of the present experiments on future tokamaks.

**Results for 2015**

* No new data provided.

**Plans for 2016**

* Objectives and plans have been agreed with the EP TG (D. Borba – spokesperson)
* Plans for new experiments in AUG and JET. Data mining from other experiments.