# IOS-5.3 Assessment of lower hybrid current drive at high density for extrapolation to ITER advanced scenarios

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| **TG priority:** Moderate | **Start date:** 2010 | **Status:**  On-going | **Personnel exchange:**  No |
| **IO priority:** High | **End date:** 2016 | **Motivation:** Physics Basis |

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| **Device /****Association** | **Contact****Person** | **2016 TGRequest** | **Activity (from JEX/JA spreadsheet)** |
| **2012** | **2013** | **2014** | **2015** | **2016** |
| C-Mod  | P. BonoliG. Wallace | Desirable | Committed | Analysis | Analysis | Analysis |   |
| Tore Supra  | M. Goniche | Desirable | Committed | Done | Done |   |   |
| FTU  | R. Cesario | Desirable | Committed | Committed | Committed |   |   |
| JET  | Yu Baranov | Desirable | Not doing | Considering | Not doing | Not doing |   |
| EAST, HT-7  | B. Ding | Desirable | Committed | Committed | Committed | Committed |   |

**Purpose**

LHCD is expected to be an efficient tool for driving off-axis current in ITER and is under consideration for H&CD upgrades. LH experiments have shown a decrease in non-thermal tails and CD with density that is stronger than expected based on earlier models. Dependences on configuration, Te and fuelling method have been found. Physical mechanisms that could explain these observations include wave refraction, collisional damping, parametric decay instabilities and scattering from fluctuations. The aim of this joint activity is to arrive at more complete physical and numerical models that can be used with increased confidence to predict LH wave coupling through the SOL and pedestal, and LHCD efficiency in ITER advanced scenarios. This would inform ITER upgrade decisions and advanced scenario development.

**Results for 2015**

* Modeling using ad hoc input spectrum modifications to high k|| show that little power there is needed to model the hard X-ray measurements in several machines. This gives the magnitude of the impact of scattering off of density fluctuations in the SOL that would be required to fill the spectral gap.
* Comparison of 2.45 GHz and 4.6 GHz in EAST indicate higher efficiency and parametric instability at 4.6 GHz. Current drive is seen at higher density with 4.6 GHz (up to 4 x 1019 m-3).
* A more realistic model of the SOL coupled with CQL-3D reproduces the density dependence of LHCD observed in C-Mod

**Plans for 2016**

* This JE will close in 2016, perhaps with a conference publication.
* Additional experiments in EAST using 2-frequencies for LHCD and poloidal phasing
* Experiments in FTU and C-Mod at high edge Te.
* Experiments in C-Mod with inside and outside measurements with calibrated probes, modelling at Tore-Supra.