

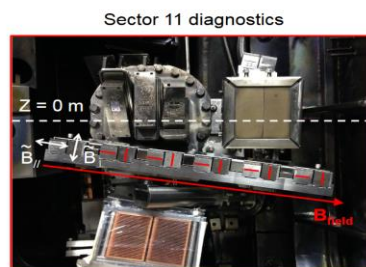
# Multi-machine investigation of ion cyclotron emission

## Purpose

- ICE is RF emission at harmonics of ion cyclotron frequencies due to resonance between fast ions (usually barely-trapped) and plasma waves.
- Collaboration to develop a diagnostic that can extract fast ion characteristics from spectrum and time evolution of the signal for use on ITER
- Validation of theoretical models: nature of the waves, dependence of spectrum on ion characteristics

## Experimental setup

- Various types of diagnostics: B-dot probes, ICRF antennas, bow-tie receiver all with fast digitizers (from MHz to GHz range)
- Capability to measure the mode numbers, time evolution and correlation with other fast ion instabilities
- Assess feasibility of measurement from inside ICRF transmission lines

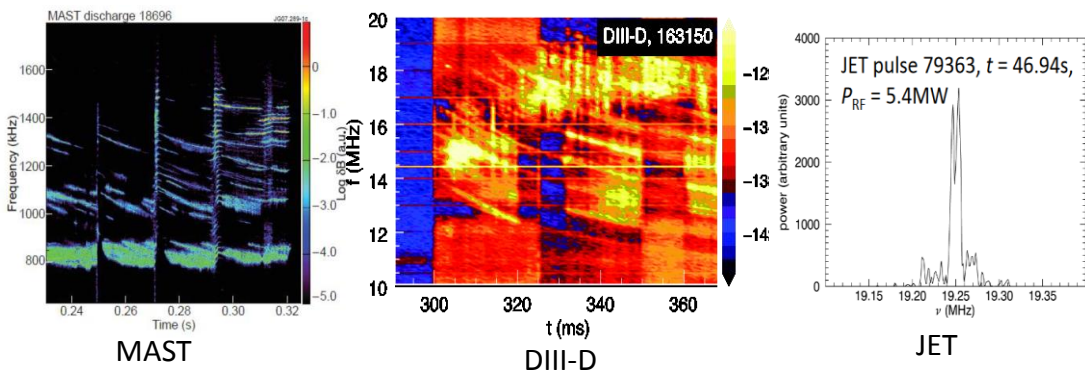


ASDEX Upgrade Bdot probes



Strap at 175°      Strap at 185°  
DIII-D ICRF antenna

## Results



Comparison of ICE frequency content for three machines

- Spectra shows a structure dependent on the heating conditions (NBI source). Details vary with the machine.
- Correlation with other instabilities (ELMs, TAEs, EIC)
- Relation between intensity of emission and fast ion concentration (linear, saturation) not yet clear.