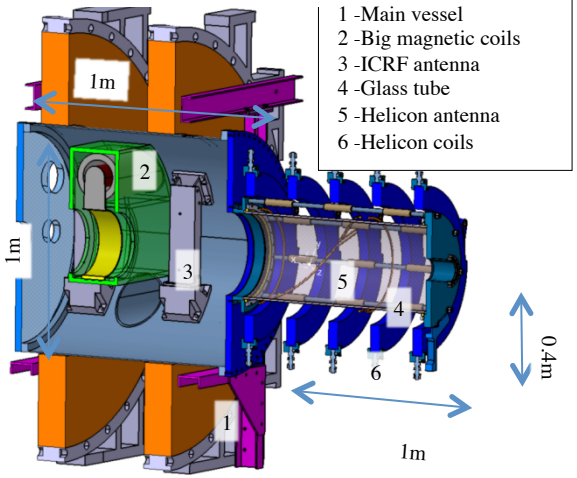
IShTAR: a helicon plasma source to characterize the interactions between ICRF and plasma

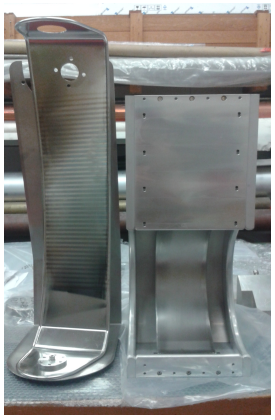
Configuration



Linear magnetic device with representative plasma edge:

- B: 0.2 T
- Plasma generated by external RF source (3kW, 0.1 T)
- density: 10e17m-3 Ar or 10e16m-3 He
- Gaussian shaped plasma 10 cm radius
- Te=5-10 eV

ICRF system



Test antennas

ICRF antenna powered by 1kW generator with automatic tuner.

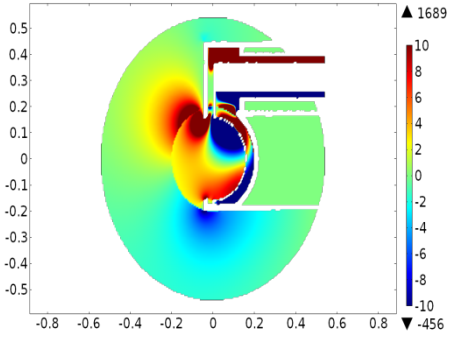
- Simple test strap
- Optimized antenna with limiters and plasma-shaped strap.

Diagnostics:

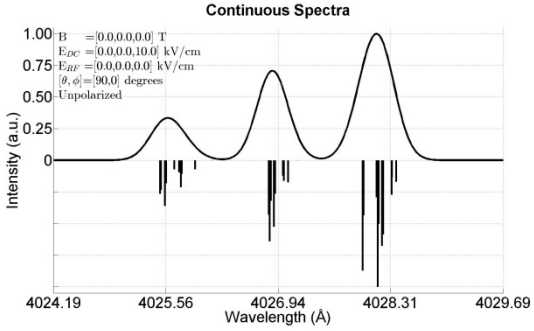
Langmuir probes (on array and movable manipulator), video cameras, high resolution spectrometer

Measurement of sheath electric field

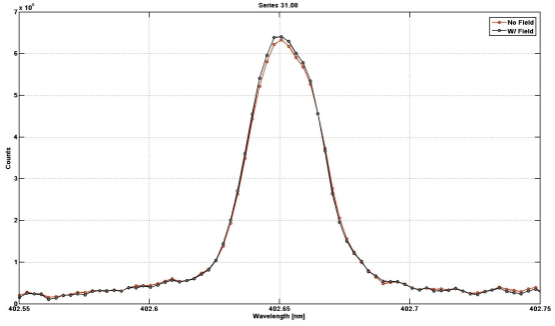
E-field measurement in plasma and sheath challenging: different components (RF, DC), high noise from the plasma (effect of static field, thermal radiation). Preliminary tests on dedicated electrode. Step by step approach to reconstruct field from Stark effect.



Modelling of ICRF fields



Calculation of resulting Stark effect



Reconstruction of sheath electric field from measured spectrum