Searching for the missing power during HHFW heating XP

80-90% of the power is accounted for in HHFW experiments so far, only for waves with the highest $k_{||}$, launched almost symmetrically co- and counter-current. For other phasings, a sizeable percent of power is not deposited in the plasma.

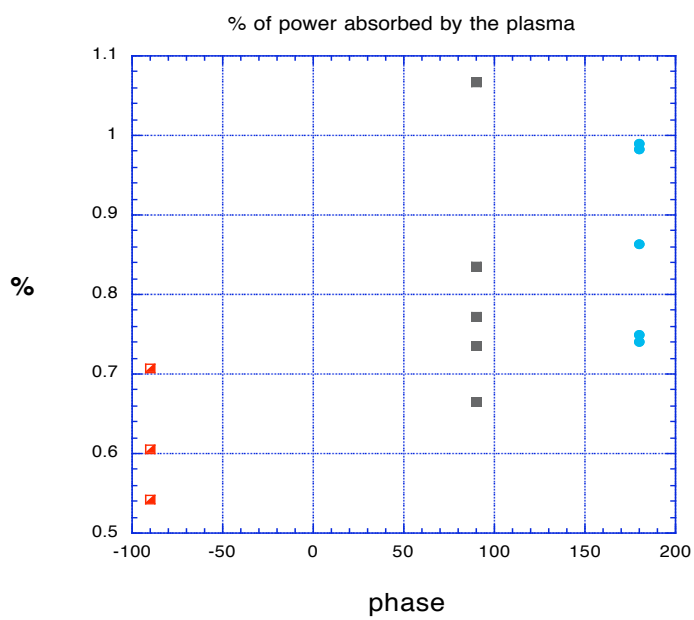
We will be looking at several mechanisms that could be responsible for these losses:

Parametric instabilities near the edge of the plasma.

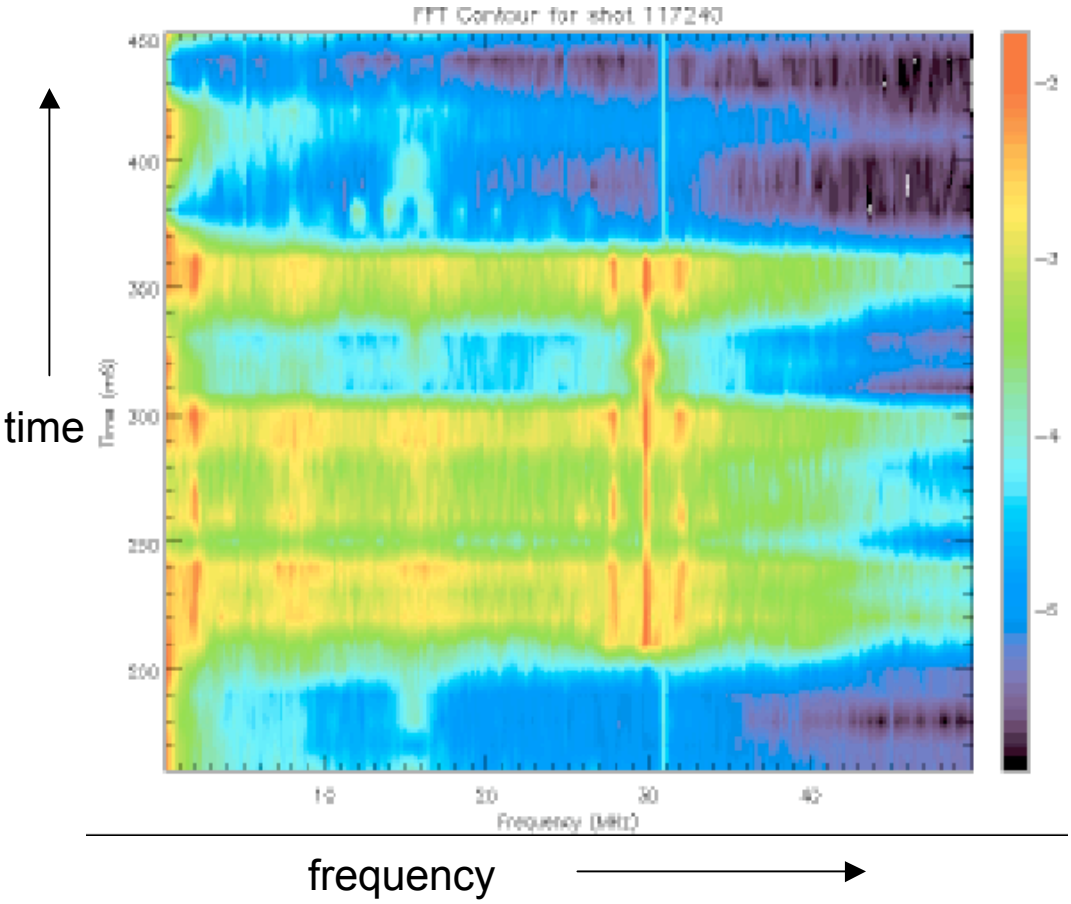
Excitation of surface waves that are probably damped by collisions.

MHD. n=1 and m=1 or 2 have been observed causing clamping of the stored energy or downright loss.

Geometrical obstacles inside the vessel, different coupling theory: this is an XP apart since it requires special modifications.

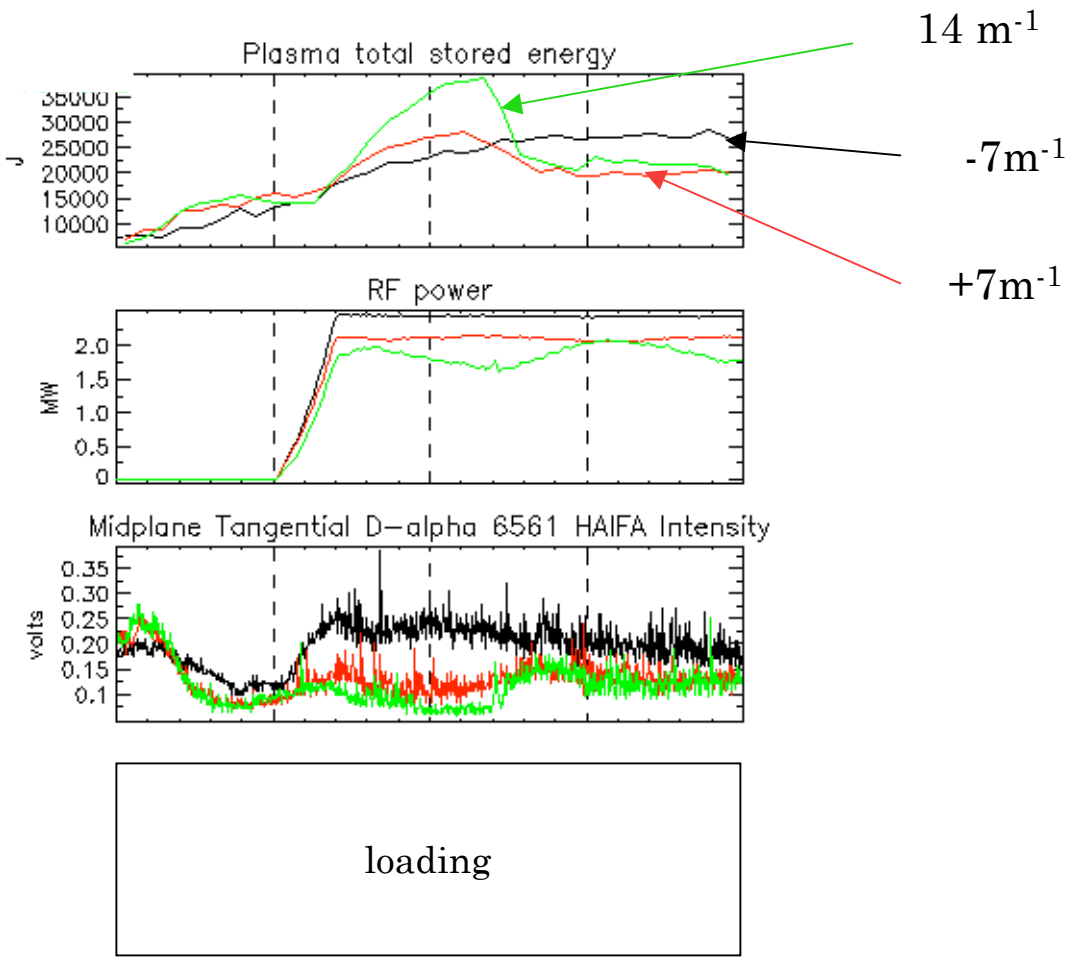


Parametric instabilities



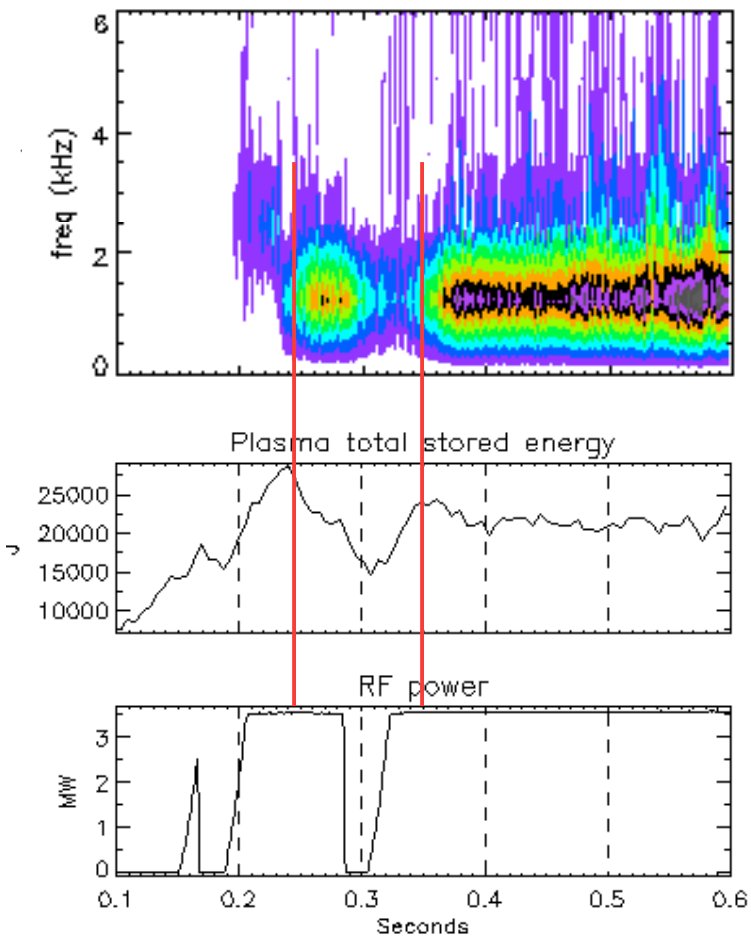
Parametric instabilities are a leading candidate for power loss.
The amplitude of the side waves is high for $k_{||} = -7\ m^{-1}$, and very weak for $k_{||} = 14\ m^{-1}$ Which has good heating efficiency.

Losses due to excitation of surface waves



Co-CD has the lowest heating efficiency. The high value of Dα suggests a strong interaction with the wall.

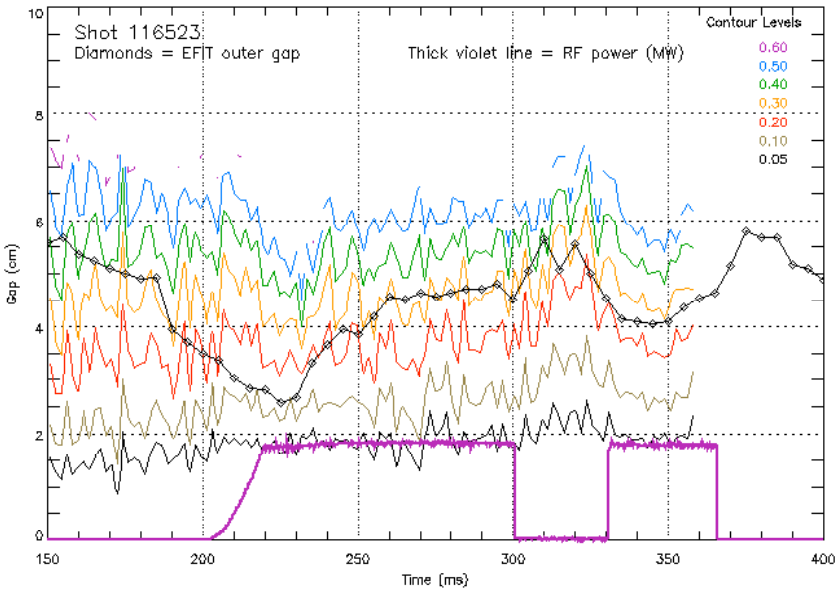
Losses due to low frequency MHD



Low frequency (1-2 kHz, n=1 and m=1 or 2) MHD cause saturation or strong degradation of the total stored energy.

Run plan

All the plasma edge diagnostics will be monitored, plus a very important new probe inserted on the diametrically opposite respect the antenna.

A power scan is intended to look at thresholds and different behavior for the three main phasings, 180° (symmetric), -90° (co-CD), +90° (counter-CD). 1, 2, 3MW

A gap scan, in which a particular density in front of the coupler (from the reflectometer in the coupler) will be used instead of the EFIT generated "last close surface". It seems appropriate to choose $2x10^{11}$ cm^{-3} as the reference density.
3.5 cm, 4.5 cm 5.5 cm.