Summary of "Towards a self consistent evaluation of the RF wave-field and the ion distribution functions in tokamak plasmas by N. Bertelli et al.

Motivation

- Taking into account self-consistently the interaction of fast waves with both the minority ion population and fast-ion/ neutral beam populations is a crucial aspect to more faithfully model and understand experimental results and to more accurately design future devices.

Key achievements

- Full wave TORIC code (implemented in TRANSP) has been extend to include the non-Maxwellian effects
  - ✓ In minority heating regime where FLR effects are considered up to the 2^{nd} order
  - ✓ In HHFW heating regime where a full-hot susceptibility tensor without any restriction in the FLR order and in the harmonic numbers
- For the thermal distribution function, the extended code has been verified against the original code showing an excellent agreement both in minority and HHFW heating regimes.
- Implementation and application of a bi-Maxwellian distribution function
  - ✓ For minority heating regime: total absorbed power at the H fundamental is insensitive to variations in perpendicular temperature
  - ✓ For HHFW heating regime: total absorbed power of fast ions is insensitive to variations in parallel temperature
- Application of a numerical distribution function: NUBEAM particles list
  - ✓ slightly larger amount of power flows to fast ions when non-Maxwellian effects are considered.
  - ✓ This is a first step towards closing the loop between the extension of TORIC and the NUBEAM code in a self-consistent way.