Analysis of Ion Energy Spectrum and Spikes in ECRH TJ-II plasmas, with Fixed and Variable Magnetic Configuration

M. Martínez[1], B. Zurro[2], A. Baciero[2], D. Jiménez-Rey[2], V. Tribaldos[3]
[1]Universidad Carlos III de Madrid, Leganés, Spain.
[2]*Laboratorio Nacional de Fusión, CIEMAT, Avenida Complutense 40, 28040 Madrid, Spain.* [3]Departamento de Física, Universidad Carlos III de Madrid, Leganés, Spain

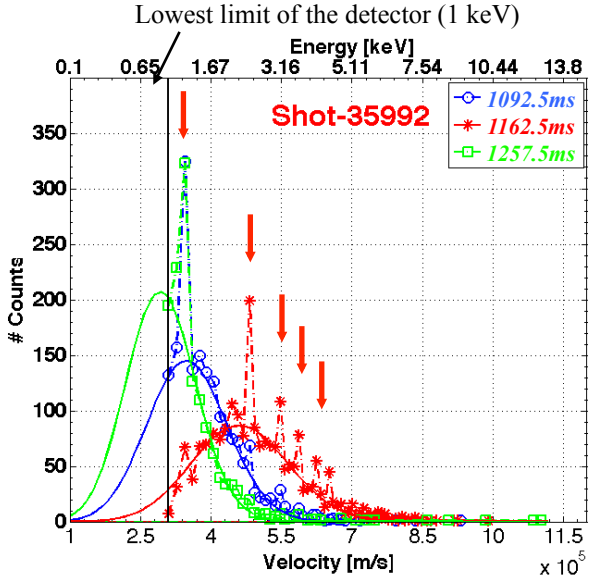

Figure 1. Magnetic configuration scanning, from ι_0 = 1.45 ➔ ι_0 = 1.39; (dot line) Histograms of the suprathermal ions at different times, (solid line) fit distribution. Red arrows point the positions where spikes are observed.

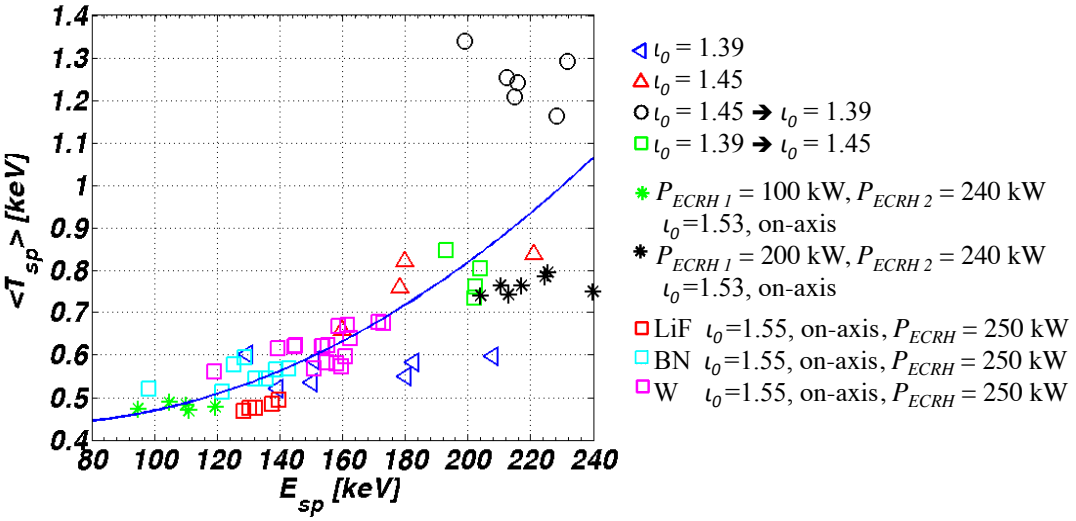

Figure 2. Plot of $<T_{sp}>$ vs. E_{sp}, for ECRH plasmas in TJ-II.

An ion luminescent probe (LP) operated in counting mode was used to measure distributions of suprathermal ions in ECRH discharges, in the range from 1keV to 30keV. Different plasma scenarios were analysed; magnetic configuration scanning (ι_0 = 1.45 ➔ ι_0 = 1.39 and ι_0 = 1.39 ➔ ι_0 = 1.45) versus fixed magnetic configuration (ι_0 = 1.39 and ι_0 = 1.45), on-axis versus off-axis heating, different injection powers (P_{ECRH} = 100kW and 200kW) and the effects on suprathermal ion distribution of impurity (impurities LiF, BN and W) injection by laser blow-off. From the measured distributions, suprathermal ion temperature (T_{sp}), energy losses by suprathermal ions (E_{sp}) and the tails of the energy distributions were analysed, is seen that does not have the same behaviour in all setups. Figure 1 is an example where the magnetic configuration was scanned from ι_0 = 1.45 ➔ ι_0 = 1.39. This example shows how magnetic configuration change along the discharge, also shows increases in the population of suprathermal ions (spikes), well localized at discrete energies. Figure 2 shows the dependence of T_{sp} with respect to E_{sp}, which depends on the setup used. For the case of the impurity injection by laser blow-off, there is a greater energy loss for W than for LiF or BN.

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