

Data analysis of the JET high energy NPA KF-1 for shot 67673

KF-1 was configured to measure hydrogen neutrals, with the energy of channel 8 equal to 1.1 MeV.

I produced overview plots covering the whole ICRH RF pulse – as for the gamma rays (JG06.279/2c).

Figure 1 shows the raw signal of KF-1 channel 5, counting neutrals at energy $E = 680$ keV (higher energy channels show the same qualitative behavior but have a much higher noise level. As most of the traces shown in the following, it was resampled at 1/8 of the acquisition frequency (200 Hz).

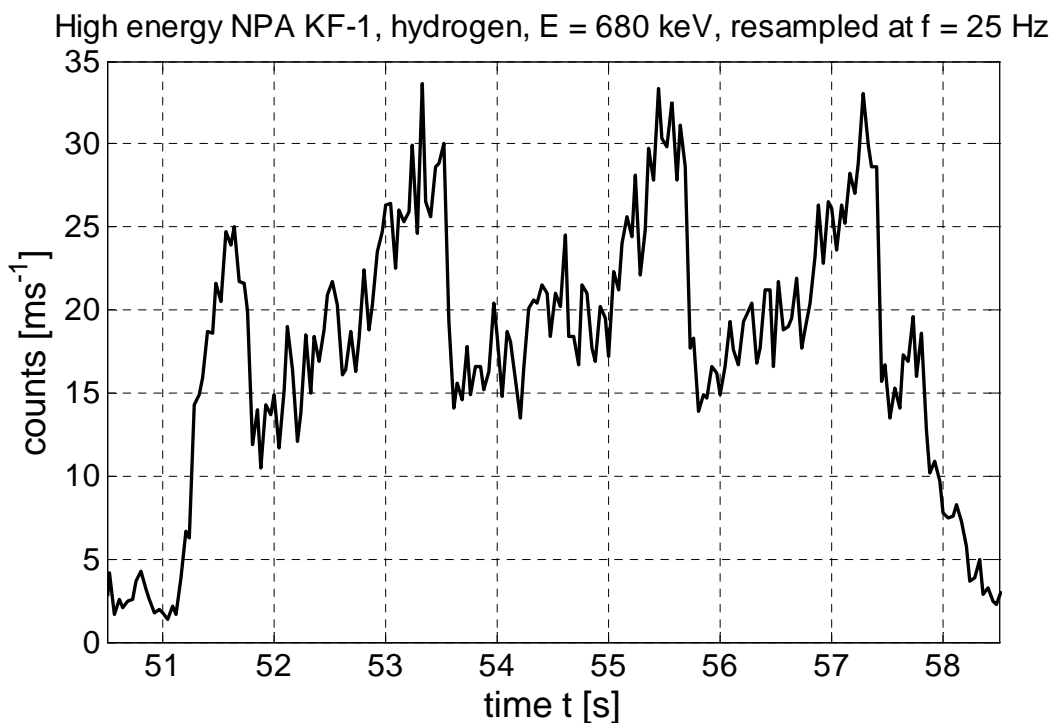


Figure 1: 67673_counts_overview

The perpendicular fast ion density (figure 2) was obtained by integration of the fast ion distribution function over ion energies covered by the NPA measurement. $f_i(E)$ was modeled using the impurity induced neutralization code *//N* [1].

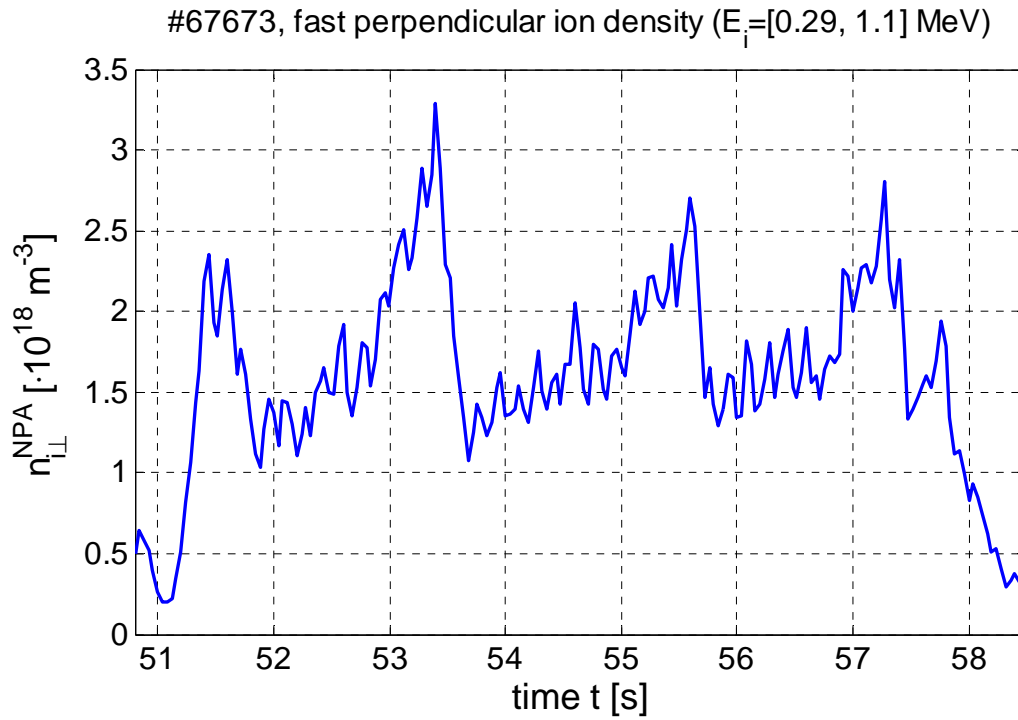


Figure 2: 67673_ni_normalized_res8

The perpendicular fast ion temperature (figure 3) was obtained from the charge exchange spectrum using a straight line fit in the energy interval $E = [450 \text{ keV}; 1.1 \text{ MeV}]$, the spectrum is reasonably linear for the chosen energy interval. I've calculated the temperature for time intervals permitting reasonable summing of the charge exchange spectrum to achieve a more robust fit, therefore the data is not uniformly scattered in time. I did not correct the obtained temperature according to the method described in [2], as I did it for discharge #66207 [4]. For the calculation of the error bars on the ion temperature, see [3].

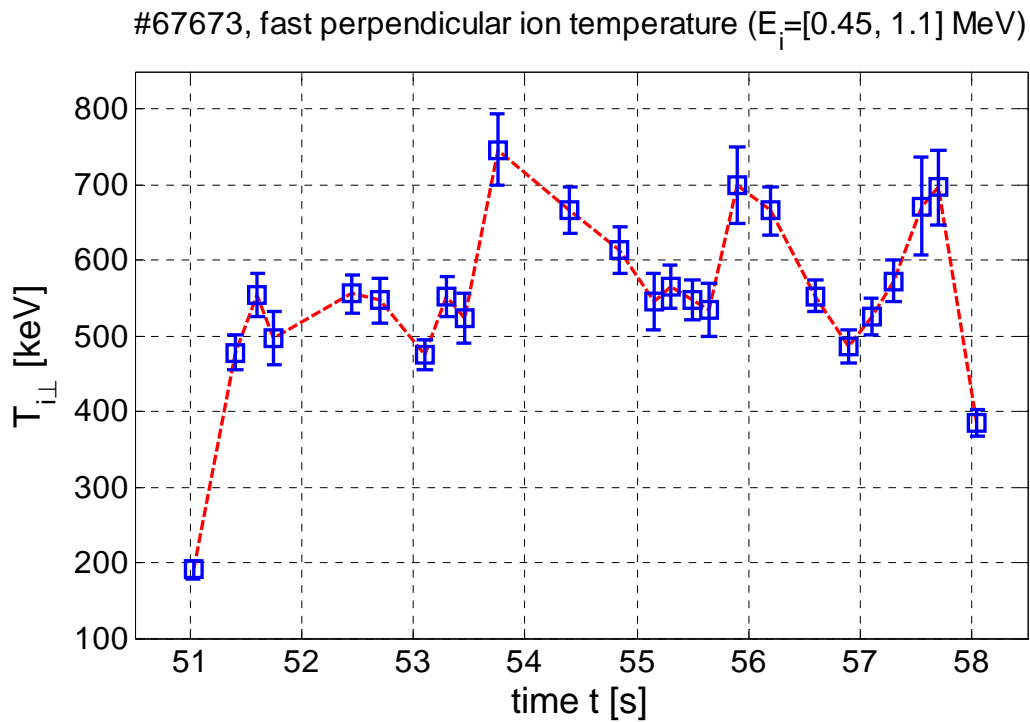


Figure 3: 67673_Ti_lowres

The NPA shows a loss in the fast ion population starting about 120 ms before the monster sawteeth. The drop is seen best on the fast ion density, whose normalized trace is plotted together with the central chord electron temperature measured by ECE and SXR in figure 4.

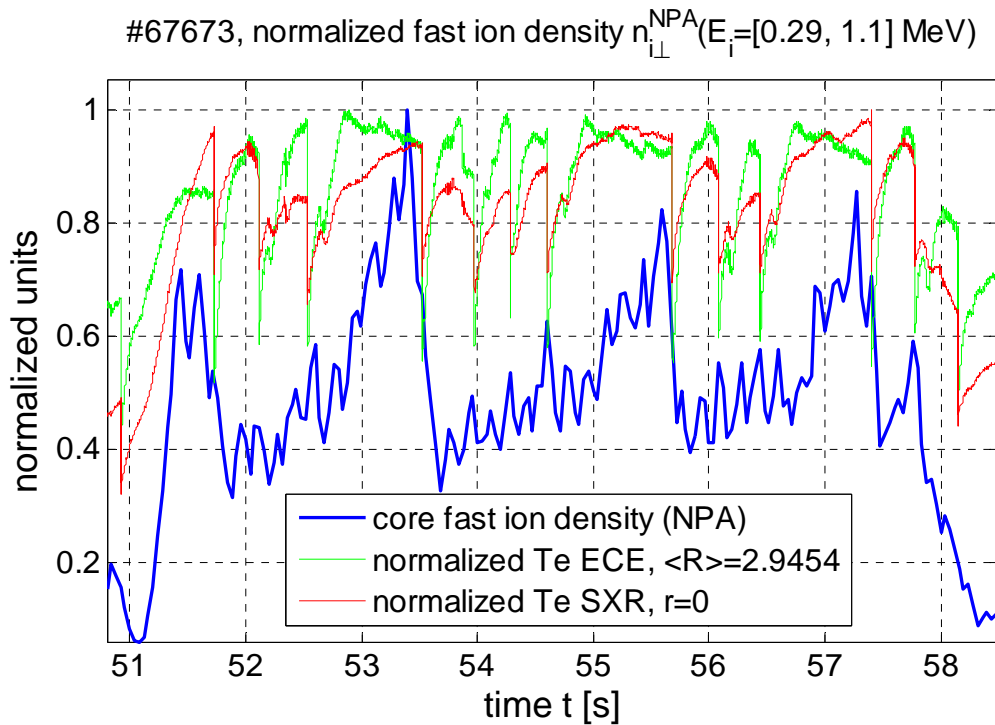


Figure 4: 67673_ni_normalized_res8

I also produced a further plot (figure 5) showing the behavior around the crash at $t = 53.52 \text{ s}$ with a better time resolution. T_e , fast T_i and fast n_i are shown.

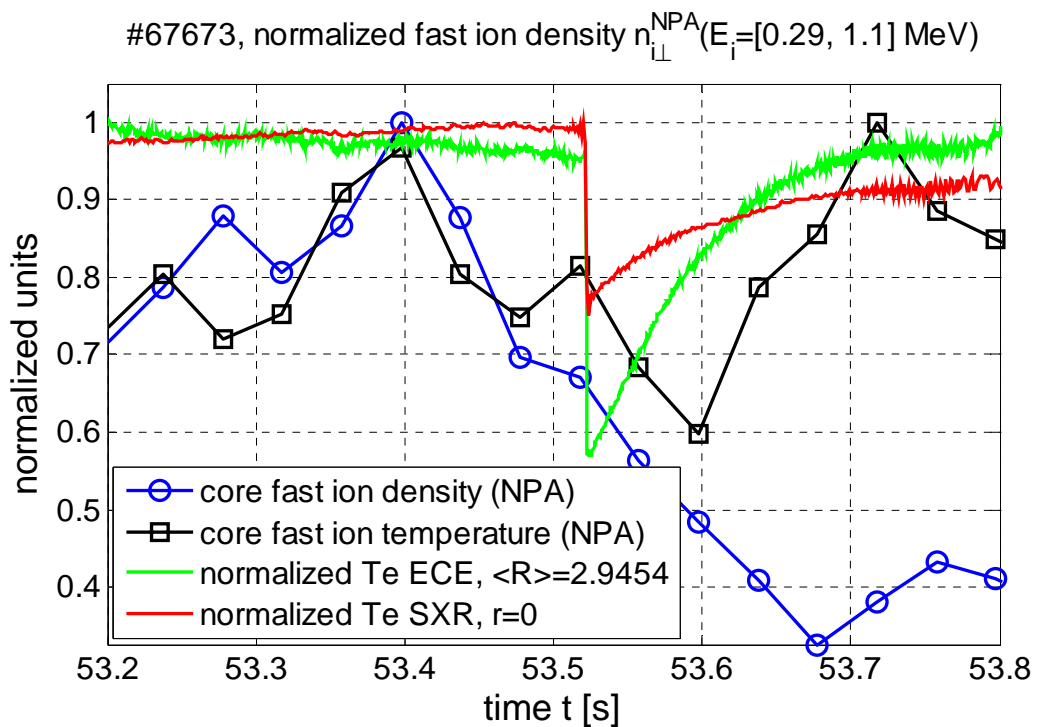


Figure 5: 67673_ni_normalized_res8_details

References

- [1] A. A. Korotkov *et al.*, Nucl. Fusion **37**, 35 (1997).
- [2] K. G. McClements *et al.*, Nucl. Fusion **37**, 473 (1997).
- [3] Ch. Schlatter *et al.*, Rev. Sci. Instr. **75**, 3547 (2004)
- [4] Ch. Schlatter, TFM meeting, 5th of May 2006,
http://users.jet.efda.org/pages/mhd-task-force/Meetings/TFMmeeting2006.05.05/Schlatter_Tornados_05May06.pdf