

Fast CXRS Measurements at the Pedestal

T. Pütterich

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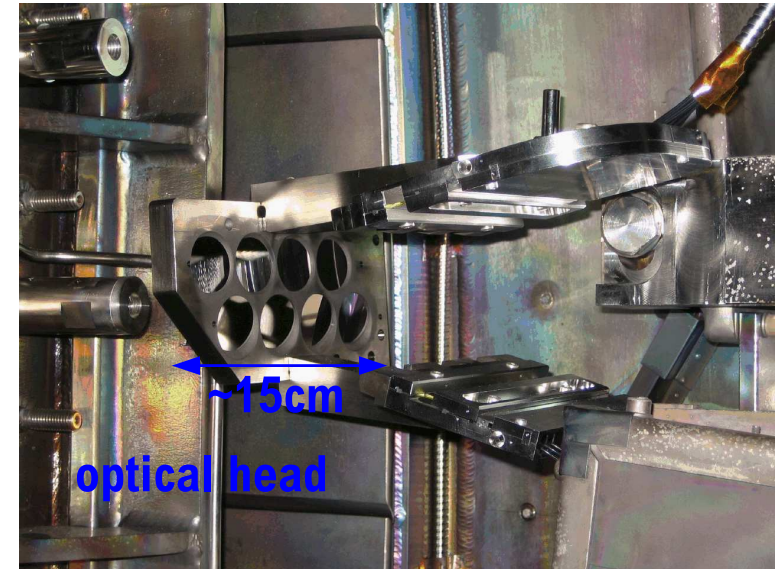
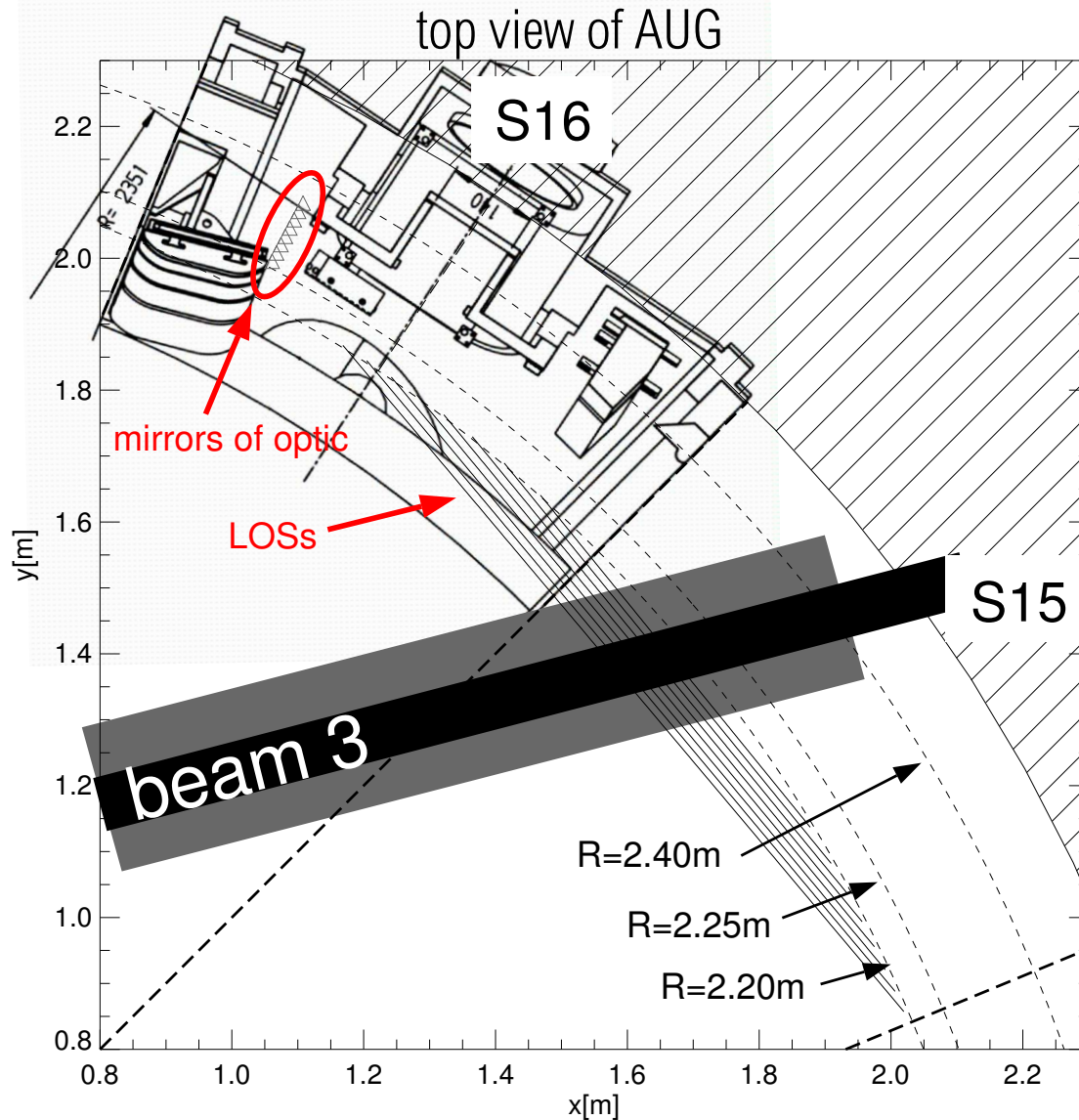
Thanks to: R. Dux¹, C. Maggi¹, A. Whiteford² and the ASDEX Upgrade Team

1) IPP, Garching

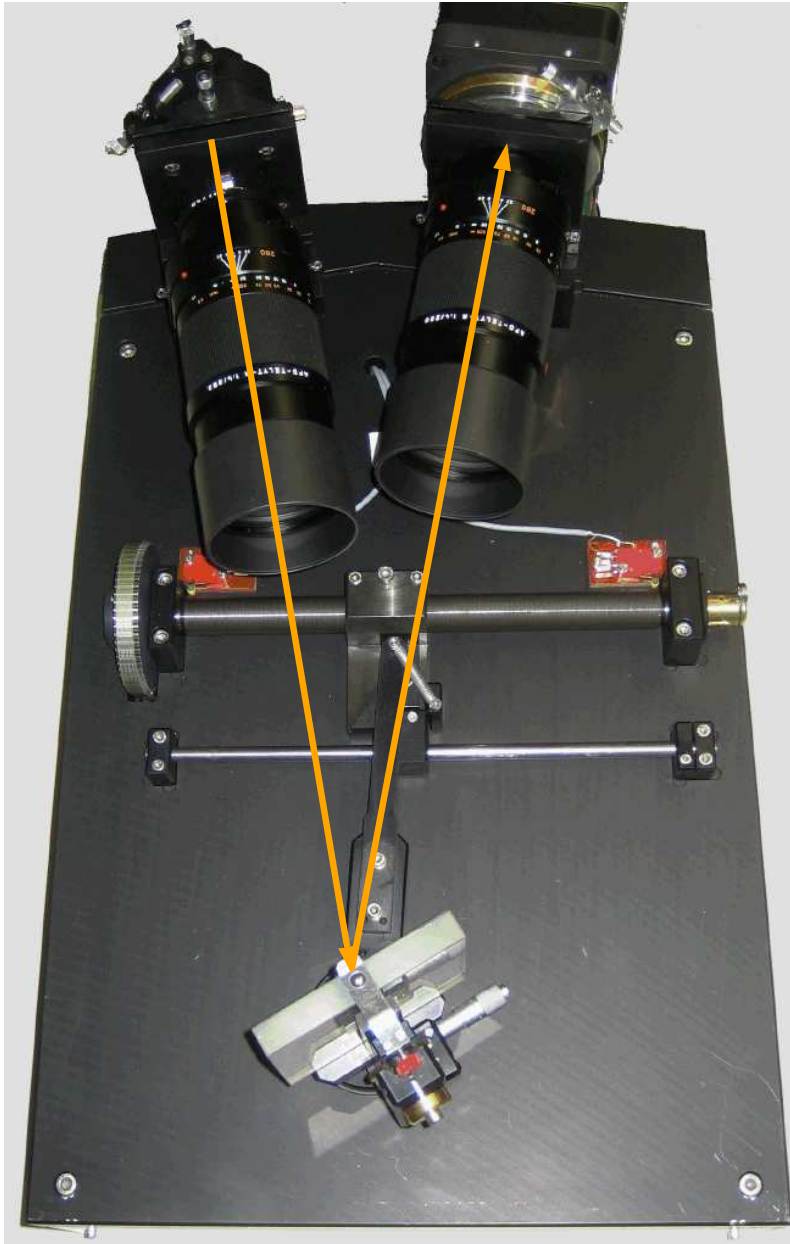
2) University of Strathclyde, Glasgow

- Why and how?
- Hardware and geometry of new edge-CXRS system at AUG
- first measurements on He, C, Ne
- ELM-cycle resolution
- Outlook

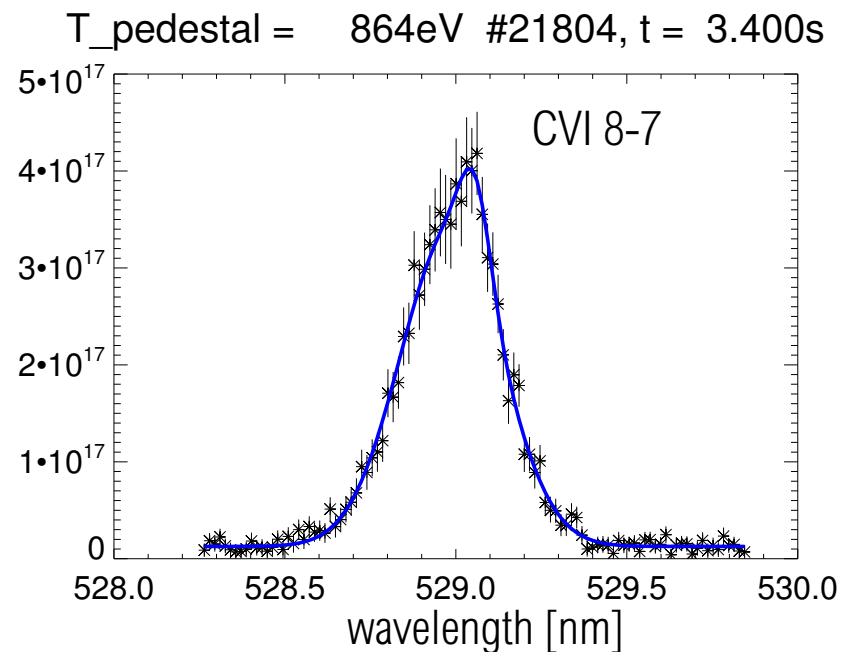
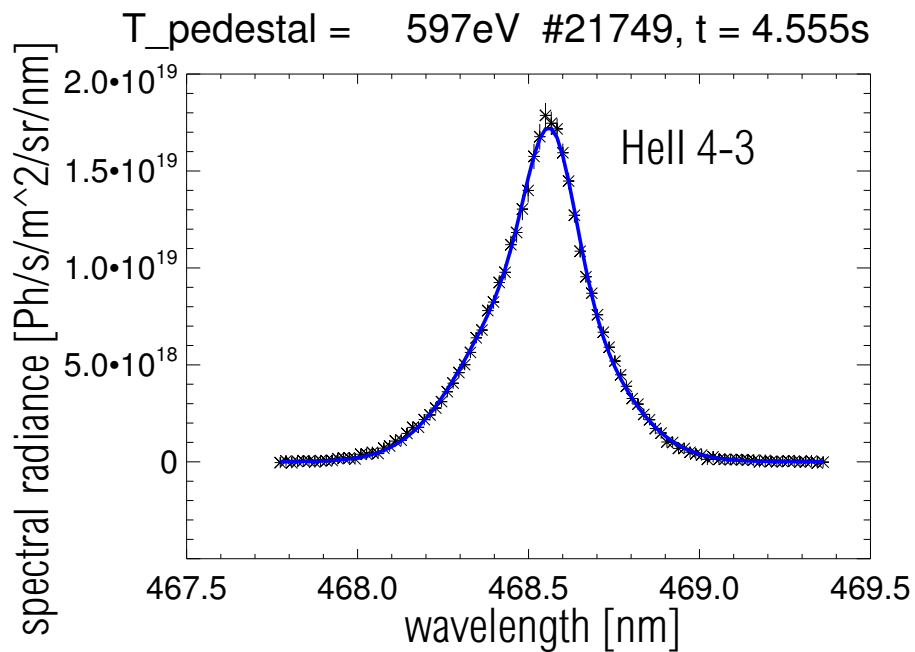
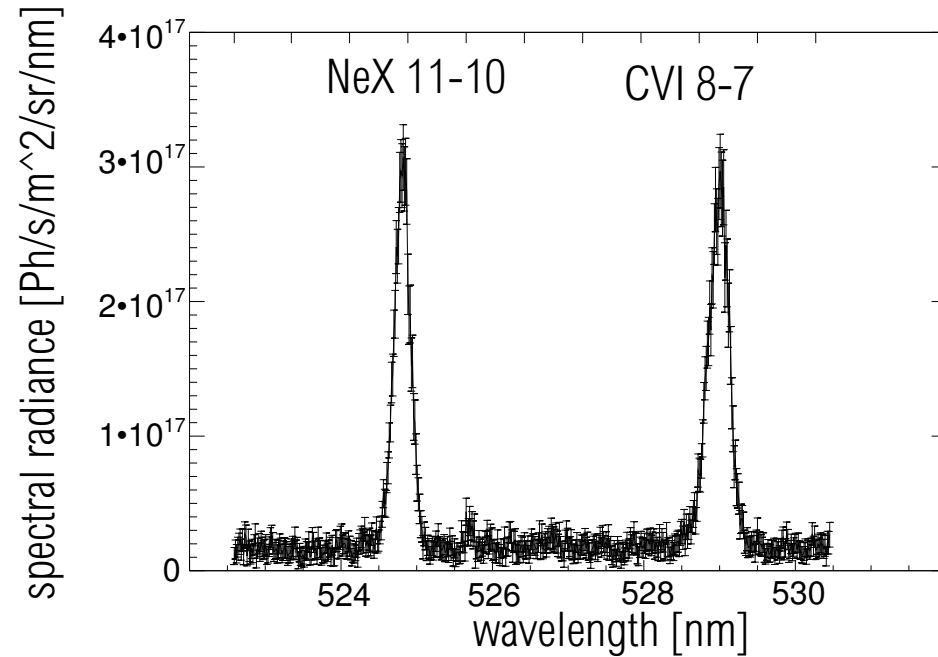
- Pedestal pressure important for total confinement
- Toroidal rotation interesting for H-mode theories
- Impurity transport at pedestal defines impurity content of plasma
- Fast necessary, because of fast phenomenas at edge (ELMs, transport)
- Spatial resolution, because of steep gradients at the edge

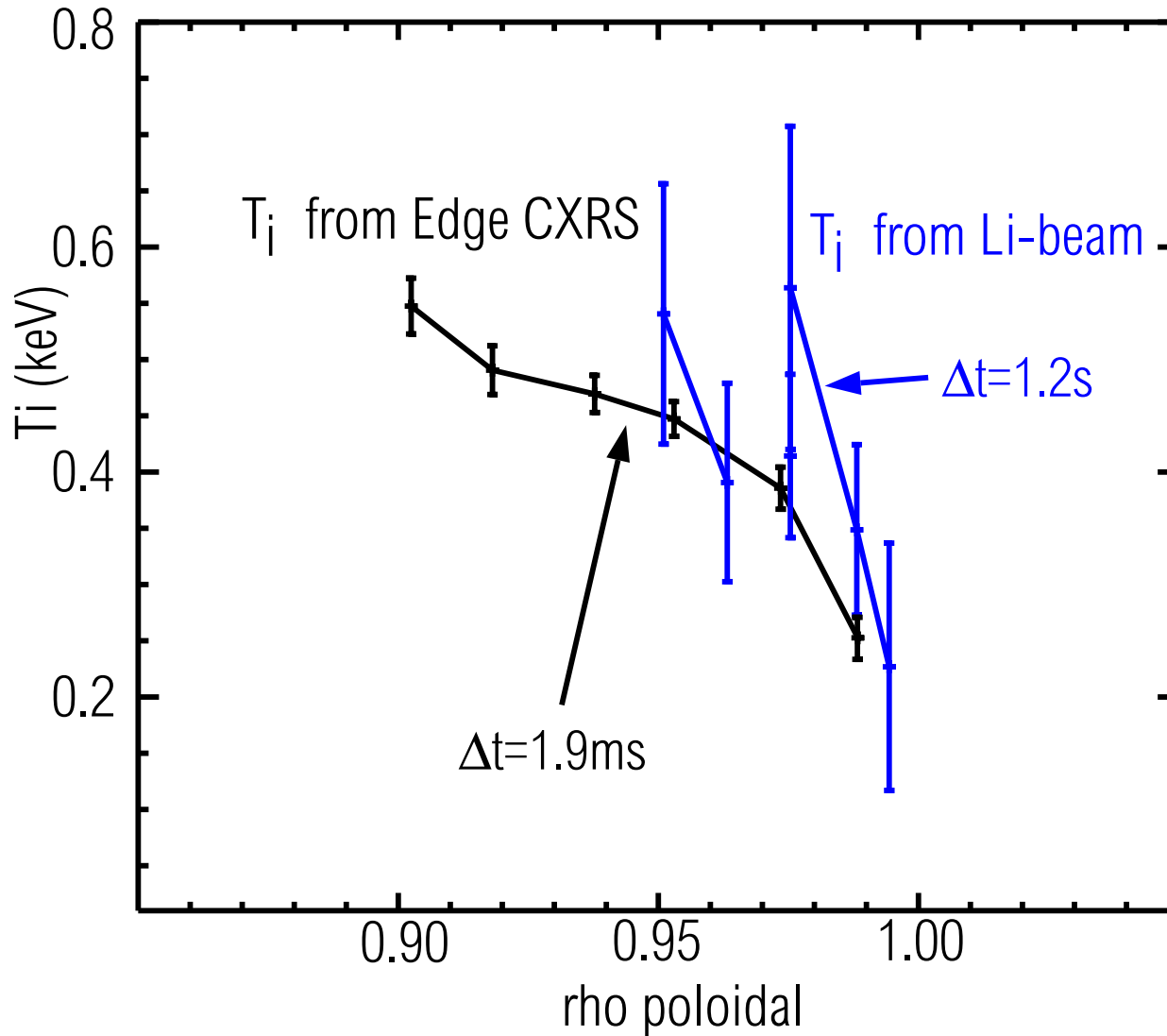


- high spatial resolution implies delicate alignment of LOS
- f/4 optics for high throughput
- plasma is observed at $0.9 < \rho_{pol} < 1.05$

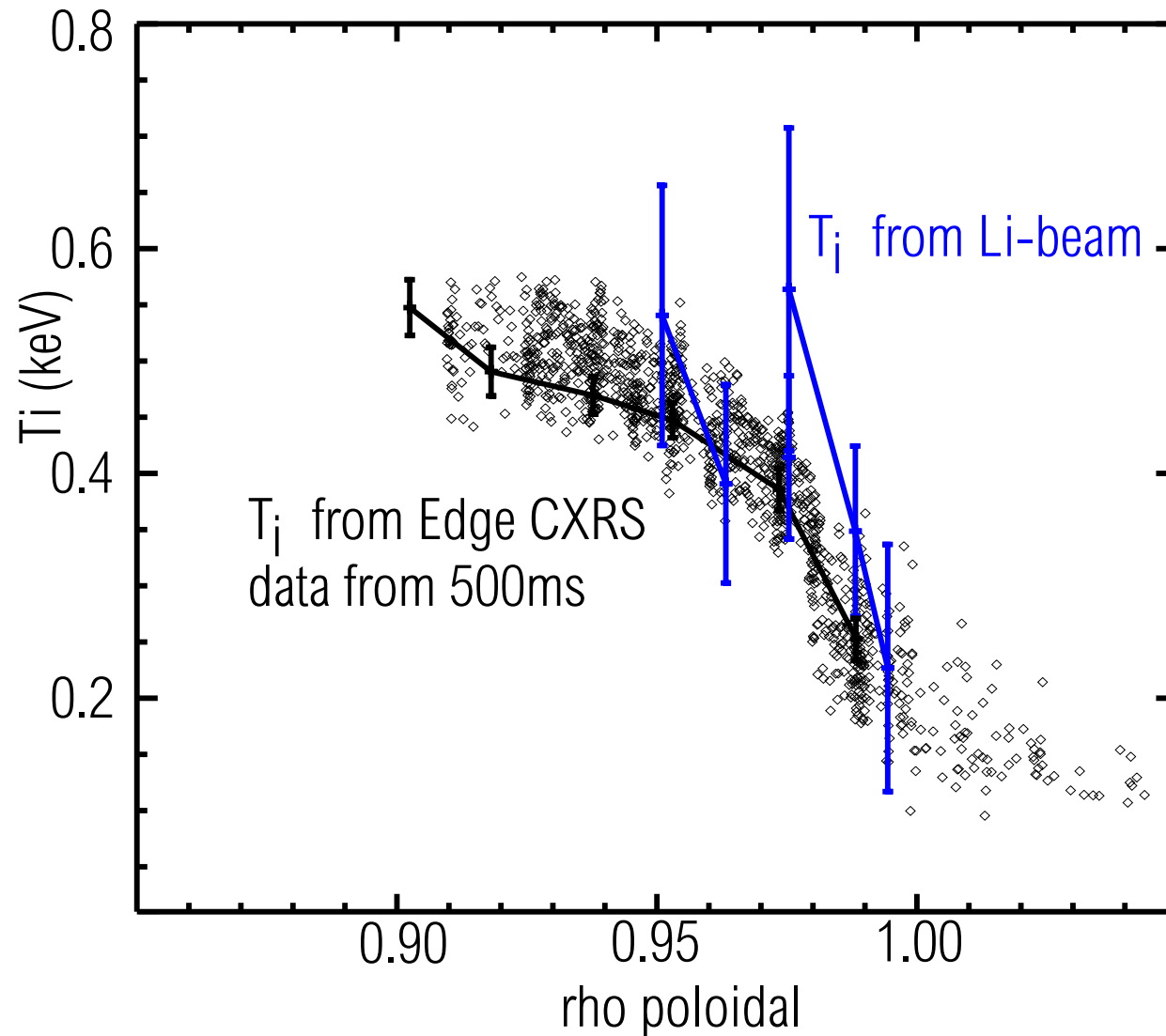


- f/4 optics, 280 *mm* focal length
- high-quality imaging → 15 channels can be measured
- 1.9 *ms* repetition time standard - down to 250 μ s possible for single channel
- back-illuminated EMCCD (high QE, fast readout (10 *Mhz*) with increased signal/noise)

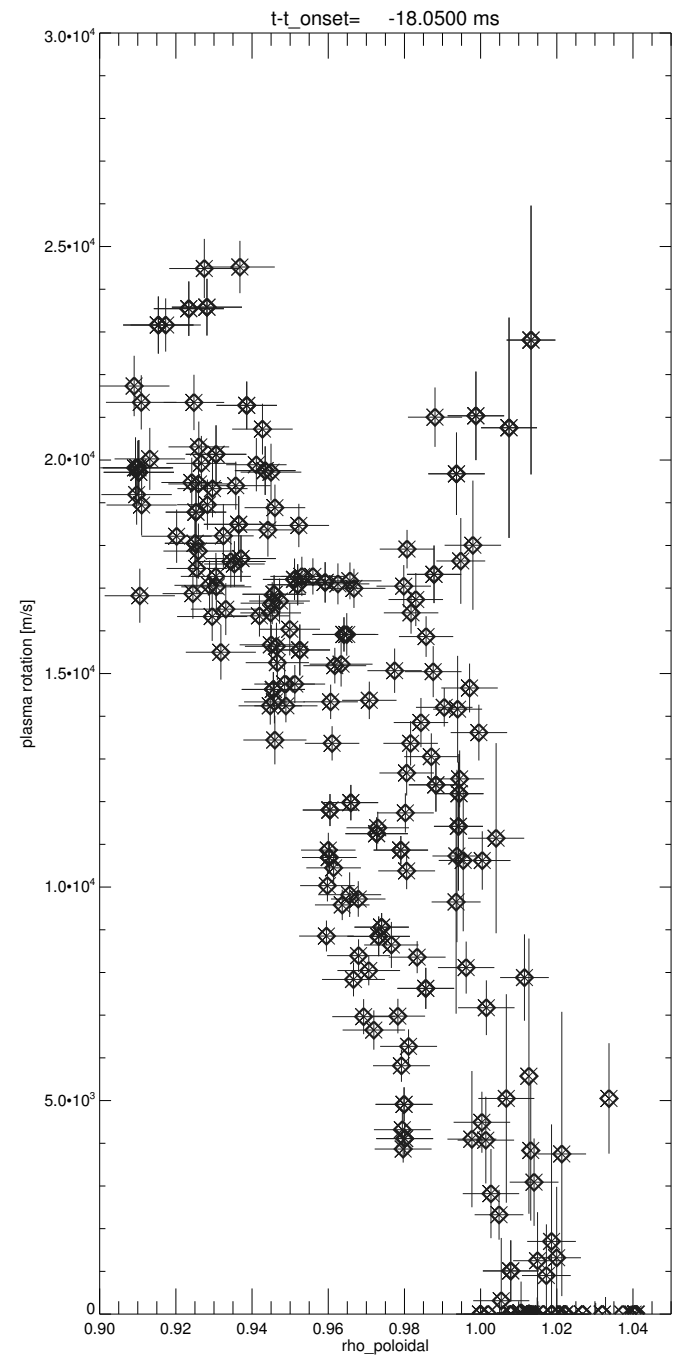
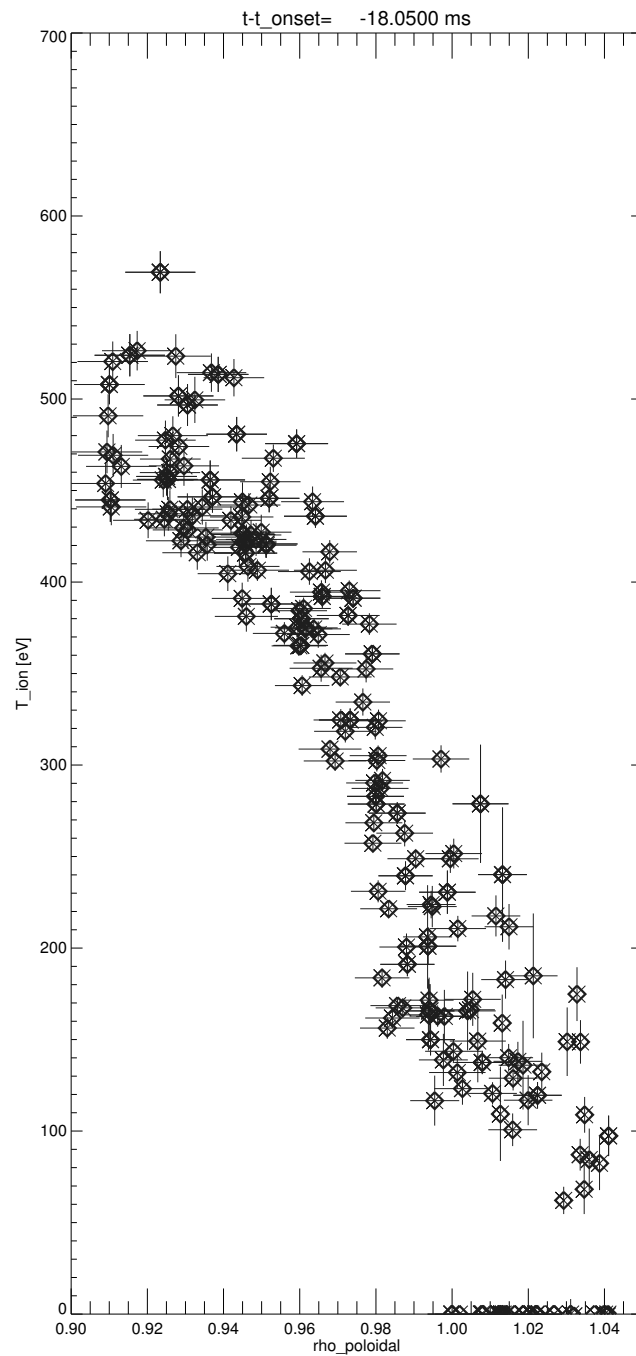
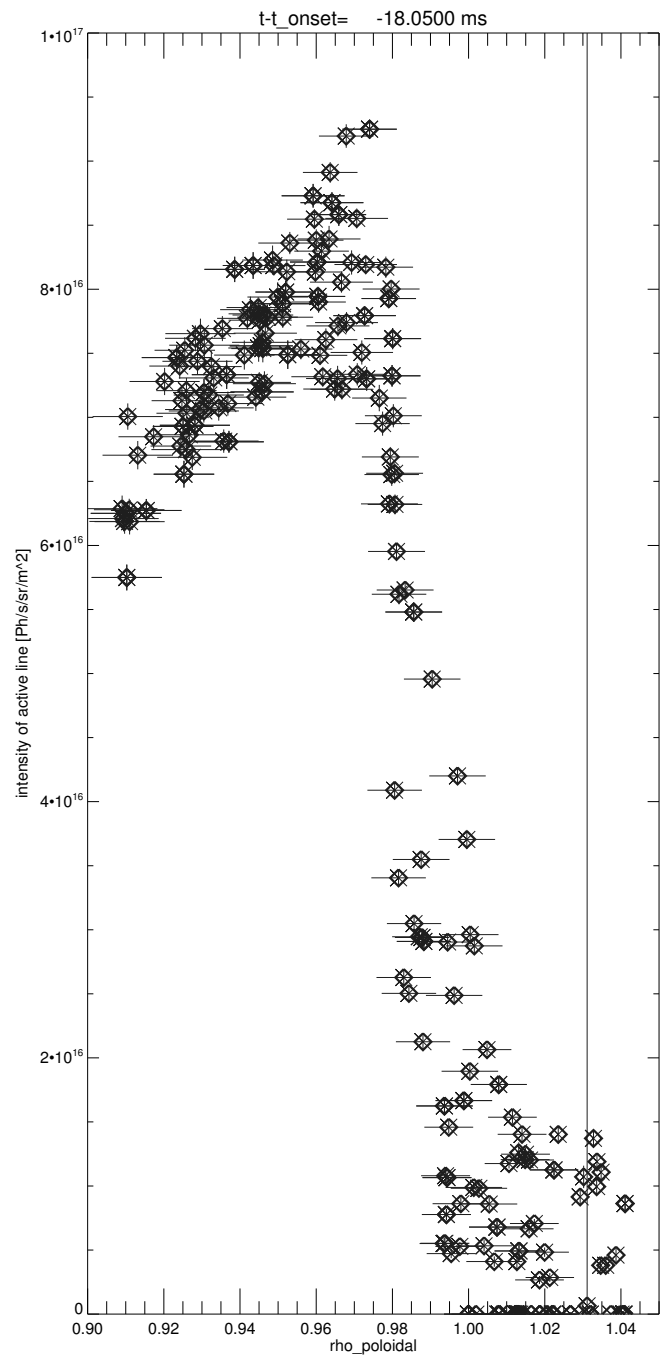


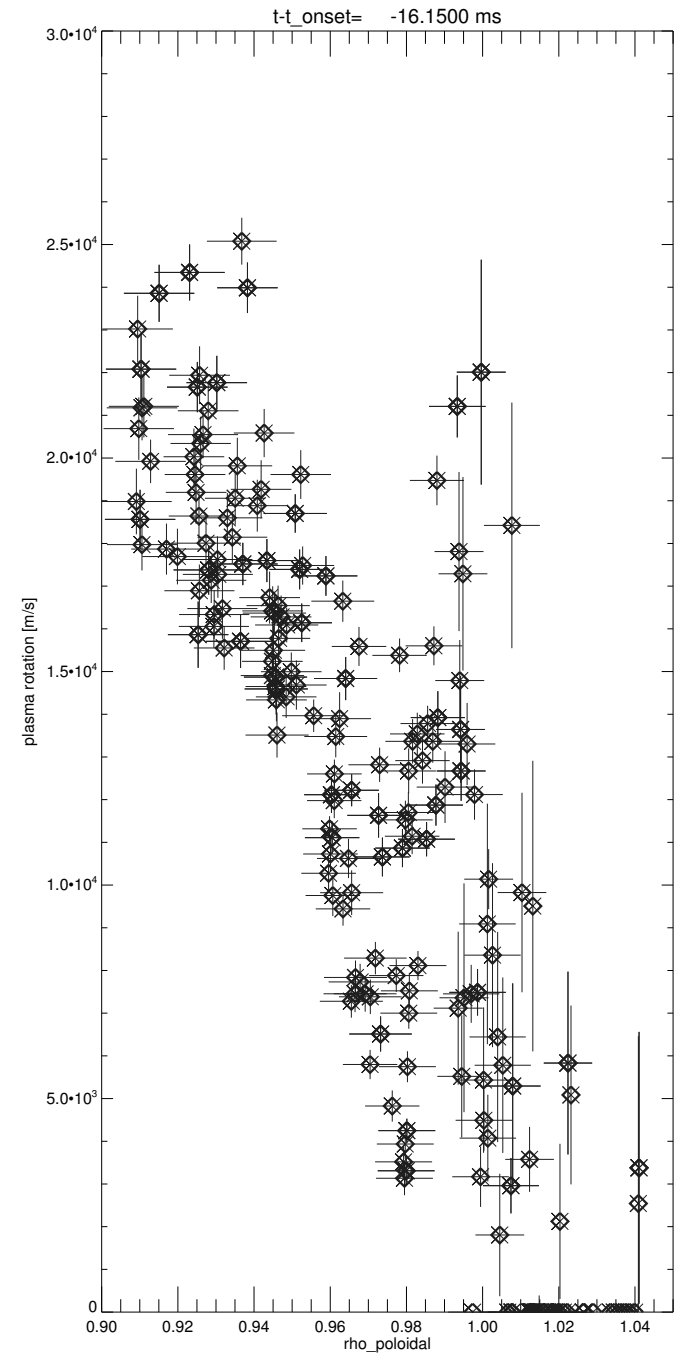
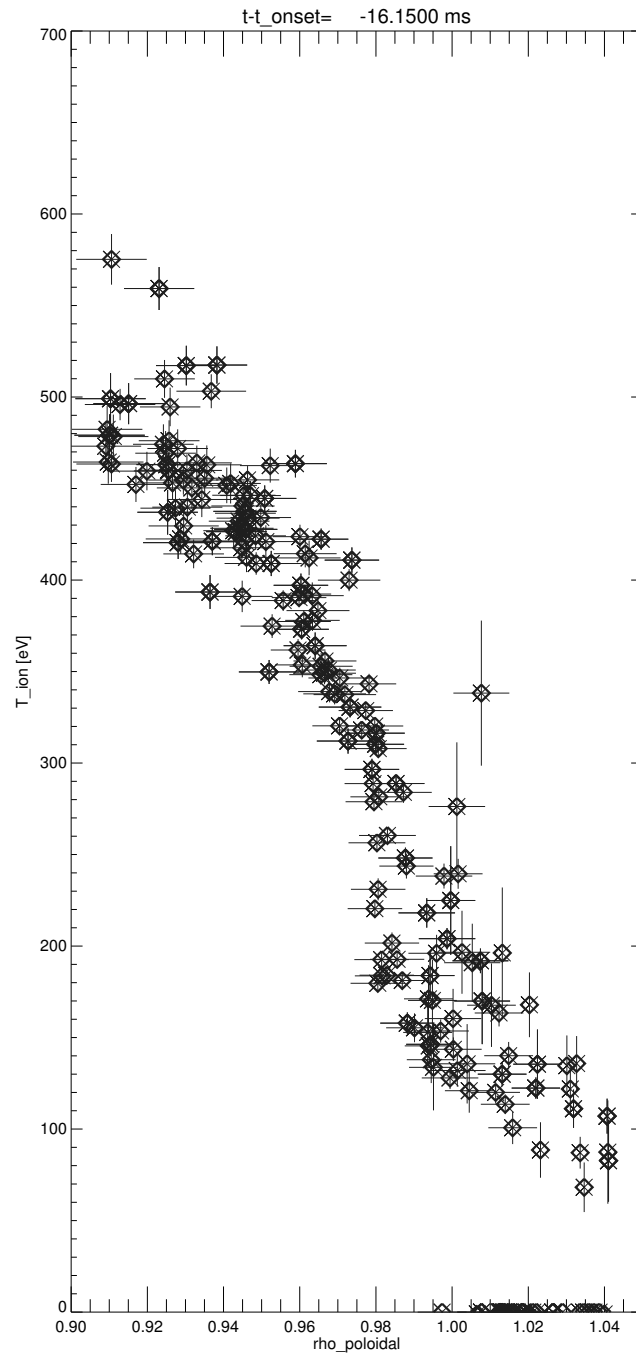
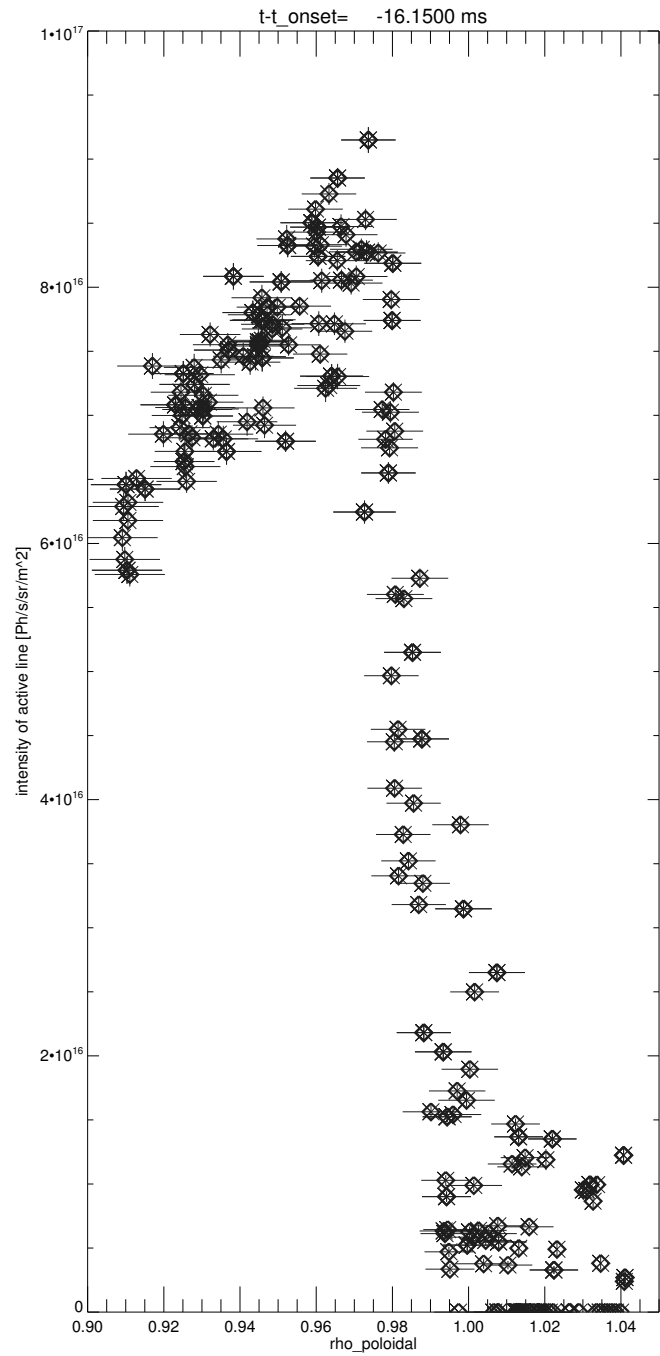


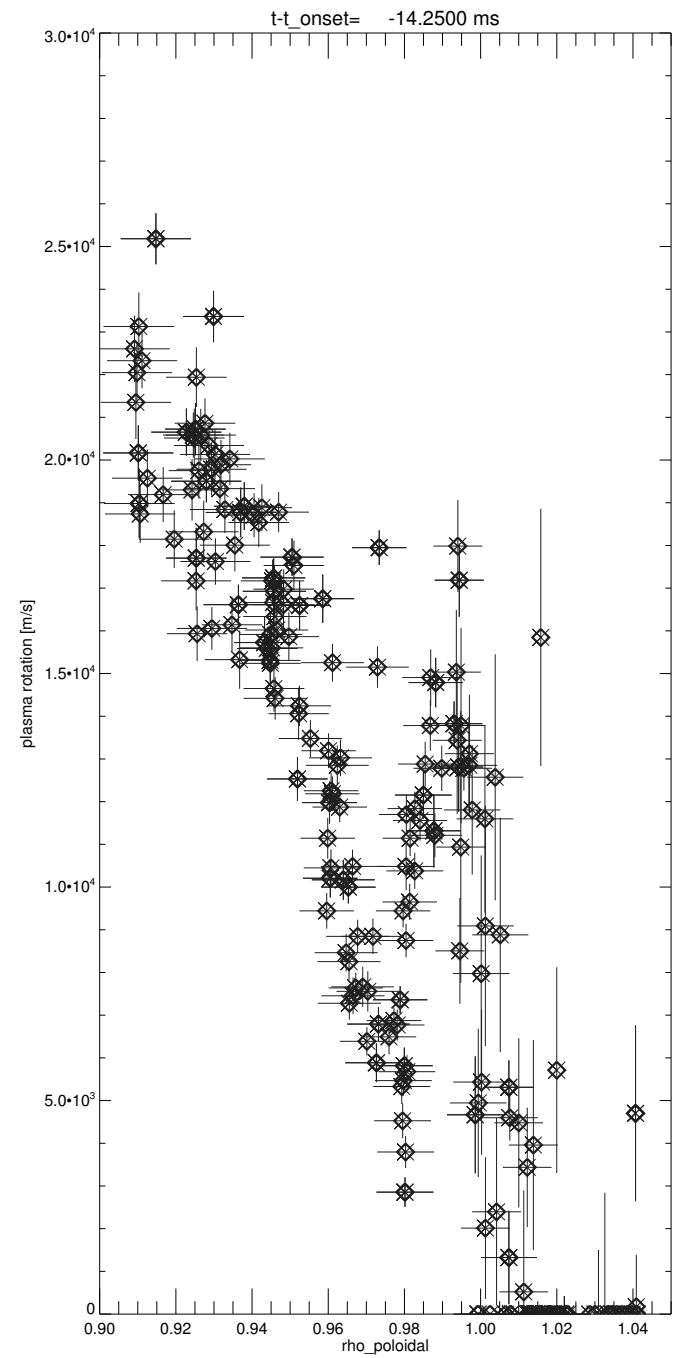
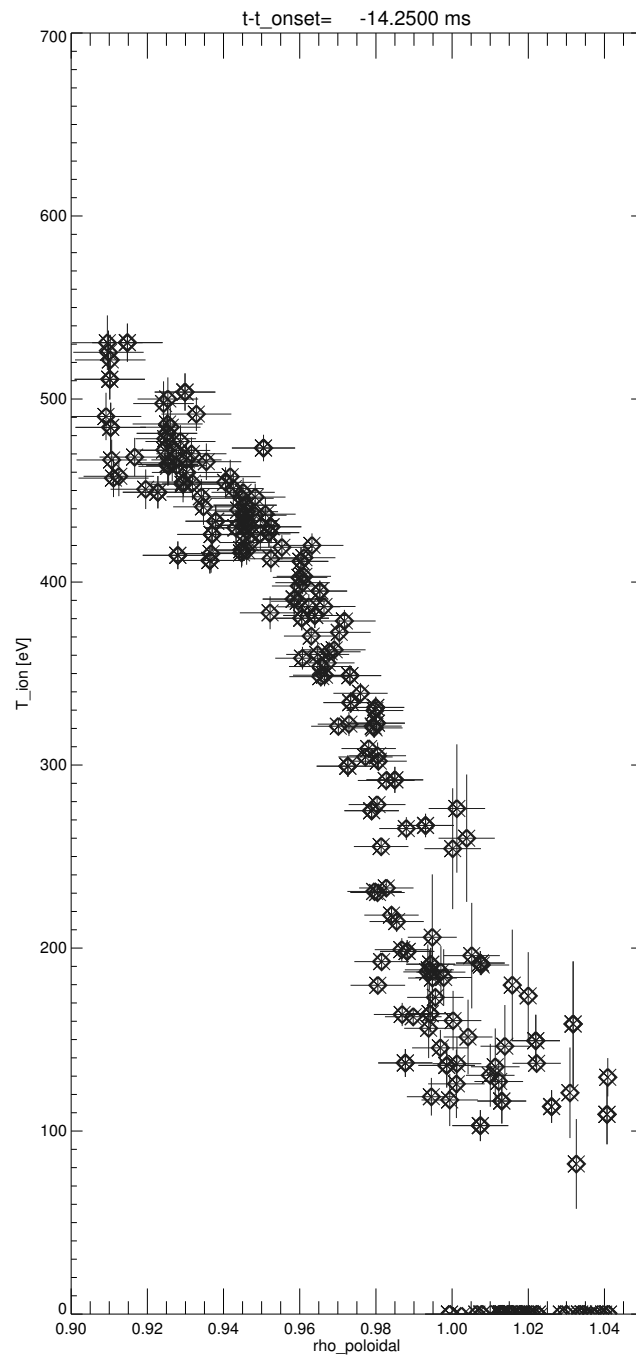
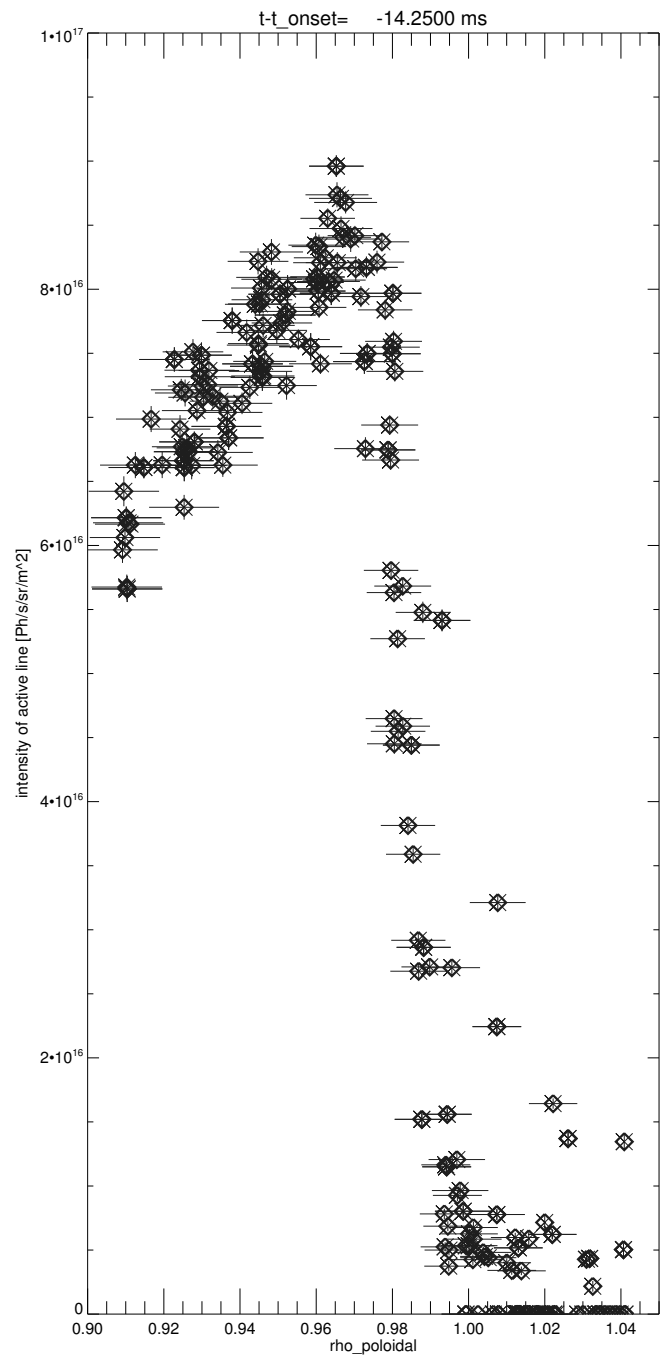
- comparison to T_{ion} from Li-beam
- much higher time resolution
- less averaging necessary

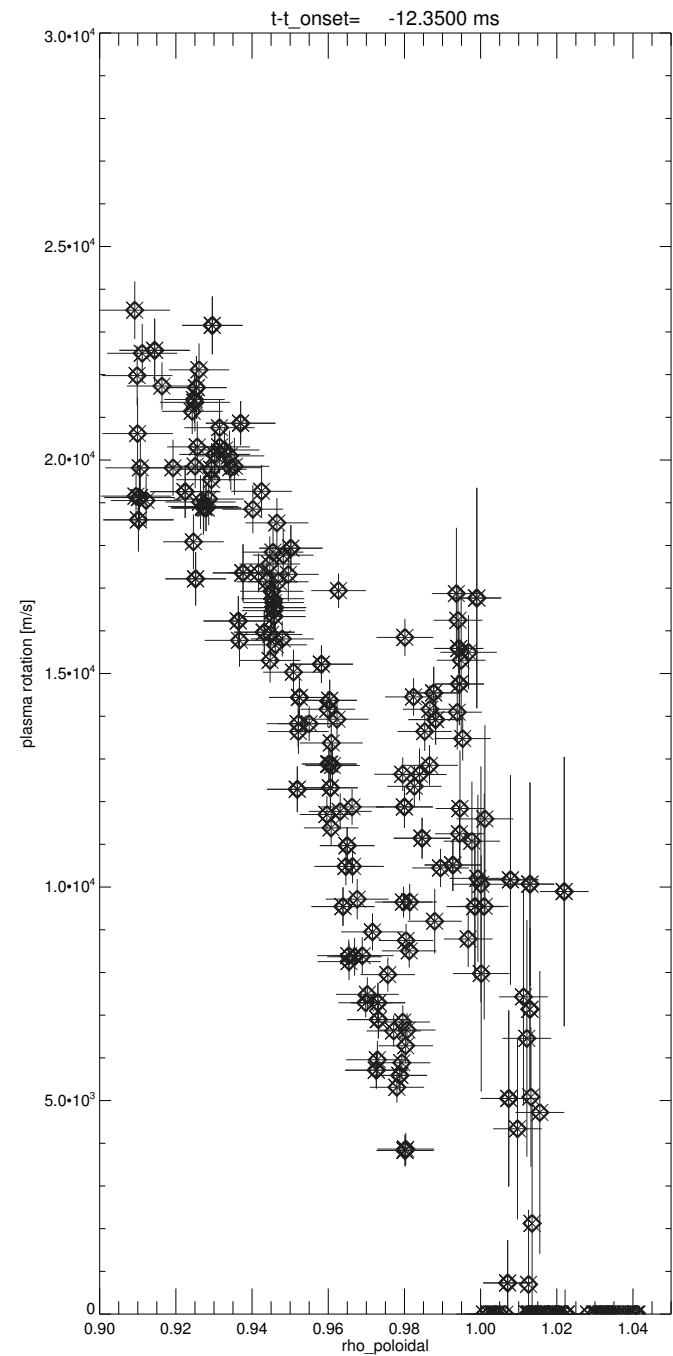
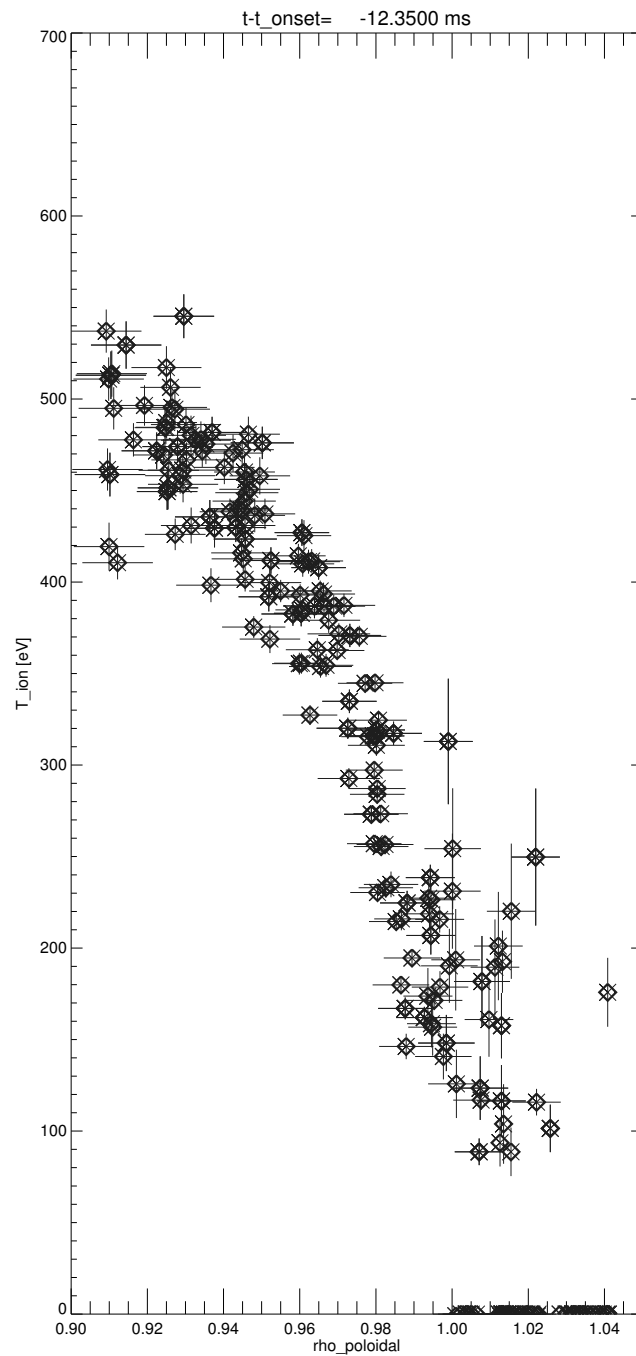
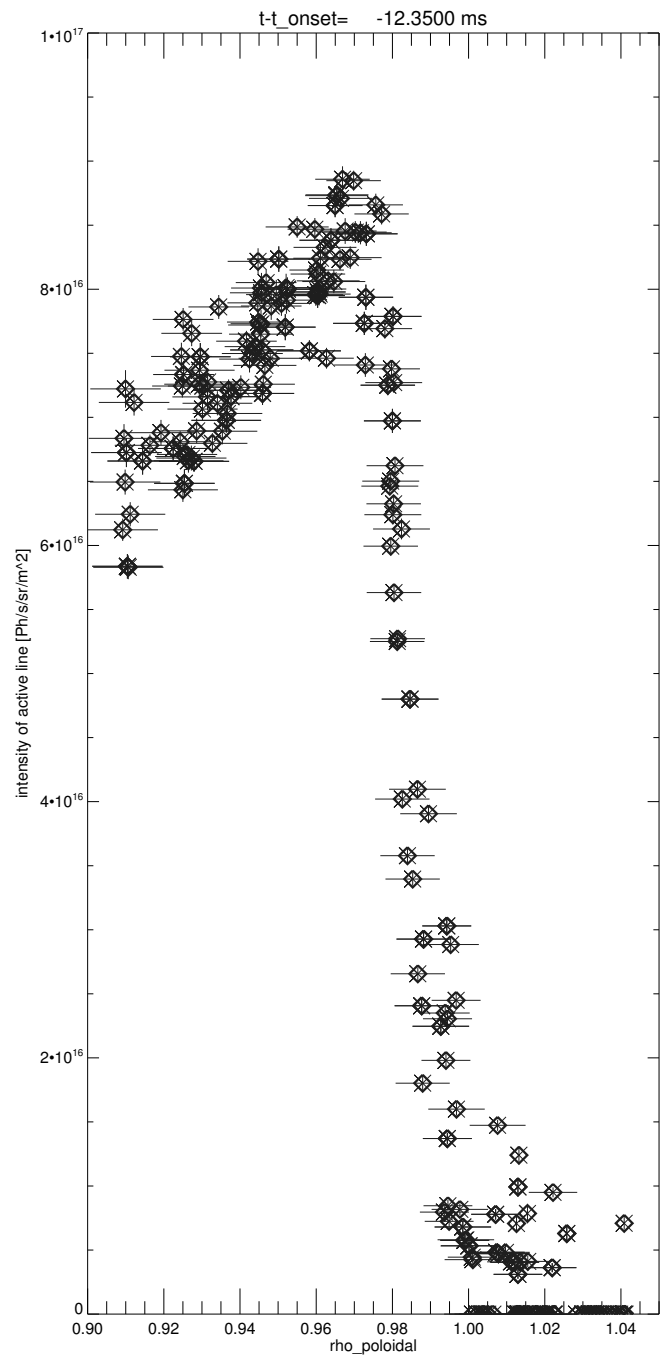


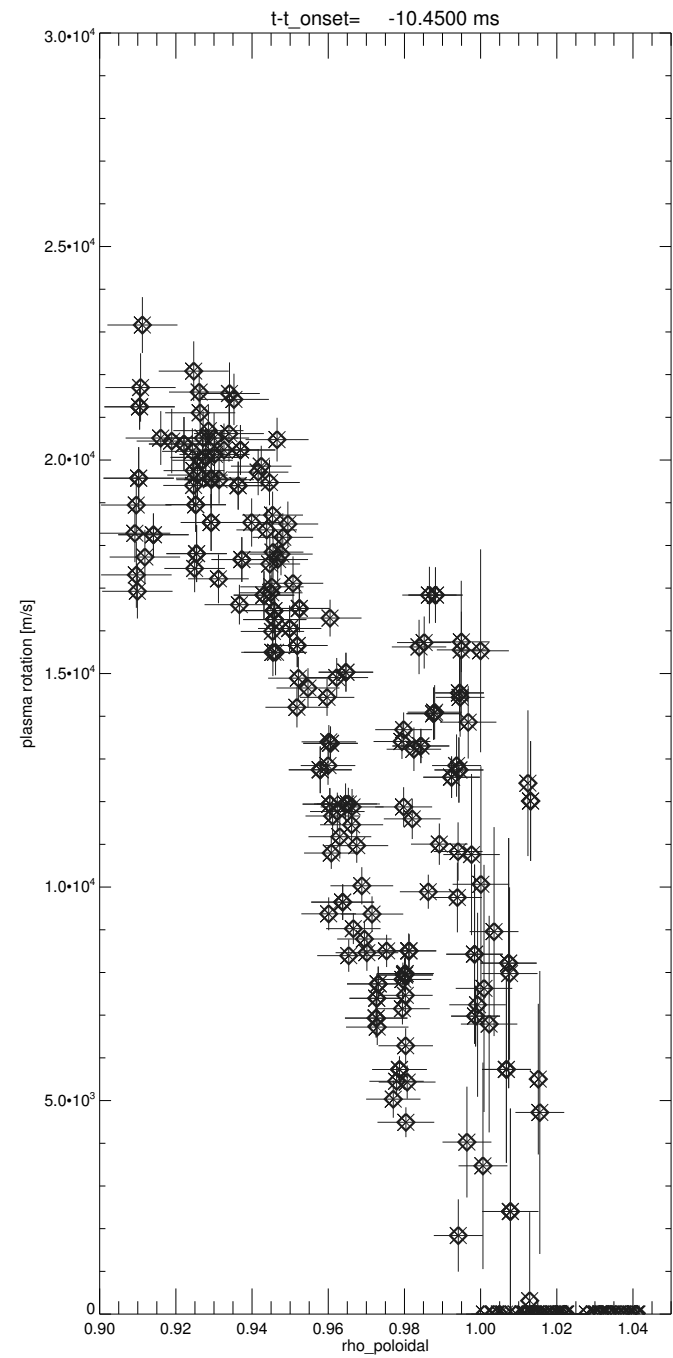
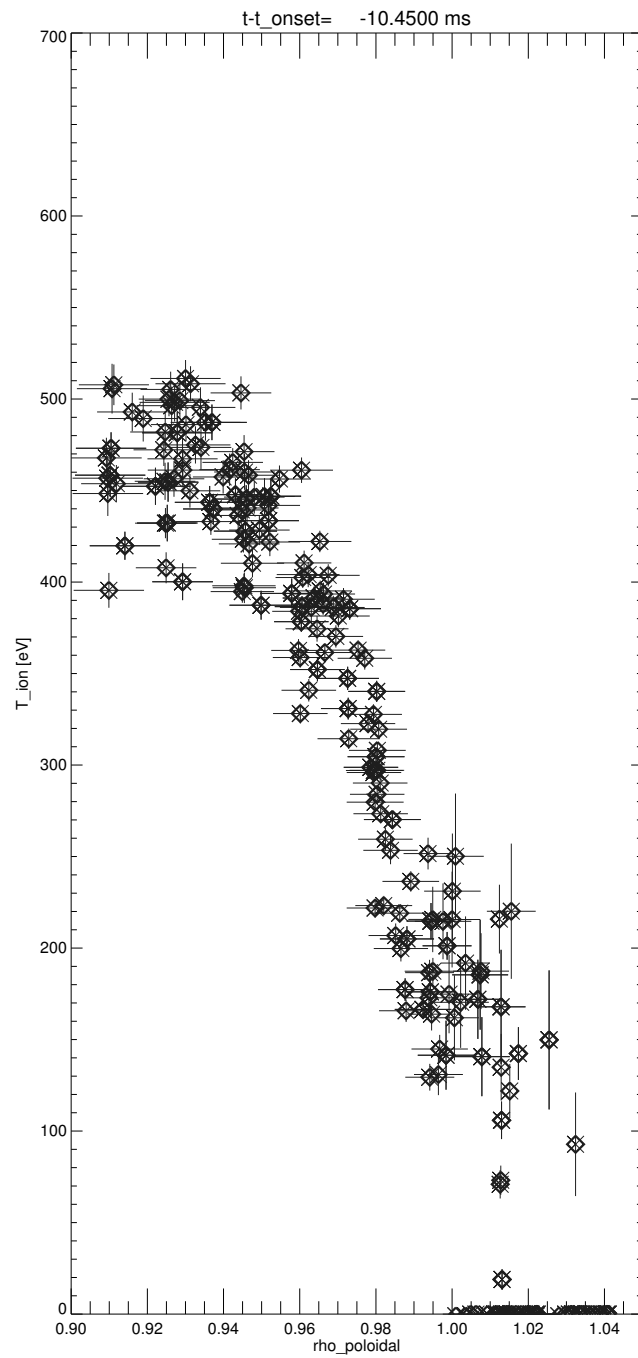
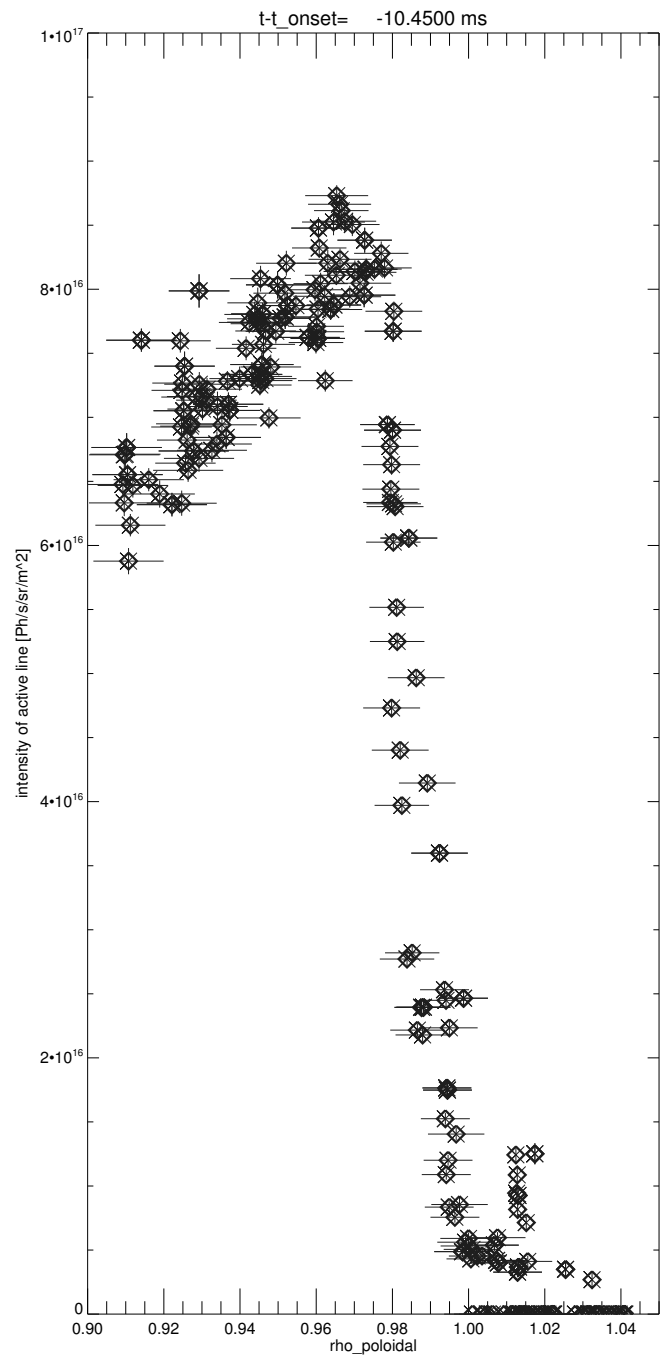
- comparison to T_{ion} from Li-beam
- much higher time resolution
- less averaging necessary
- movement of plasma increases spatial resolution

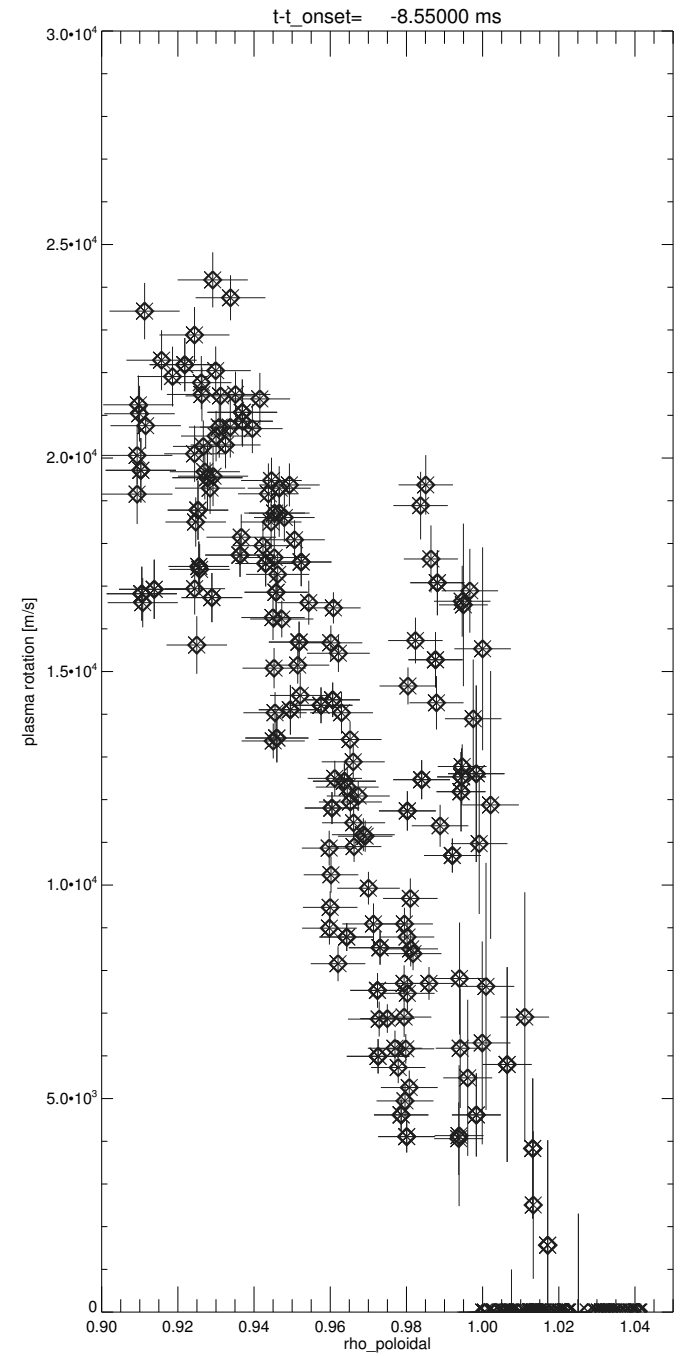
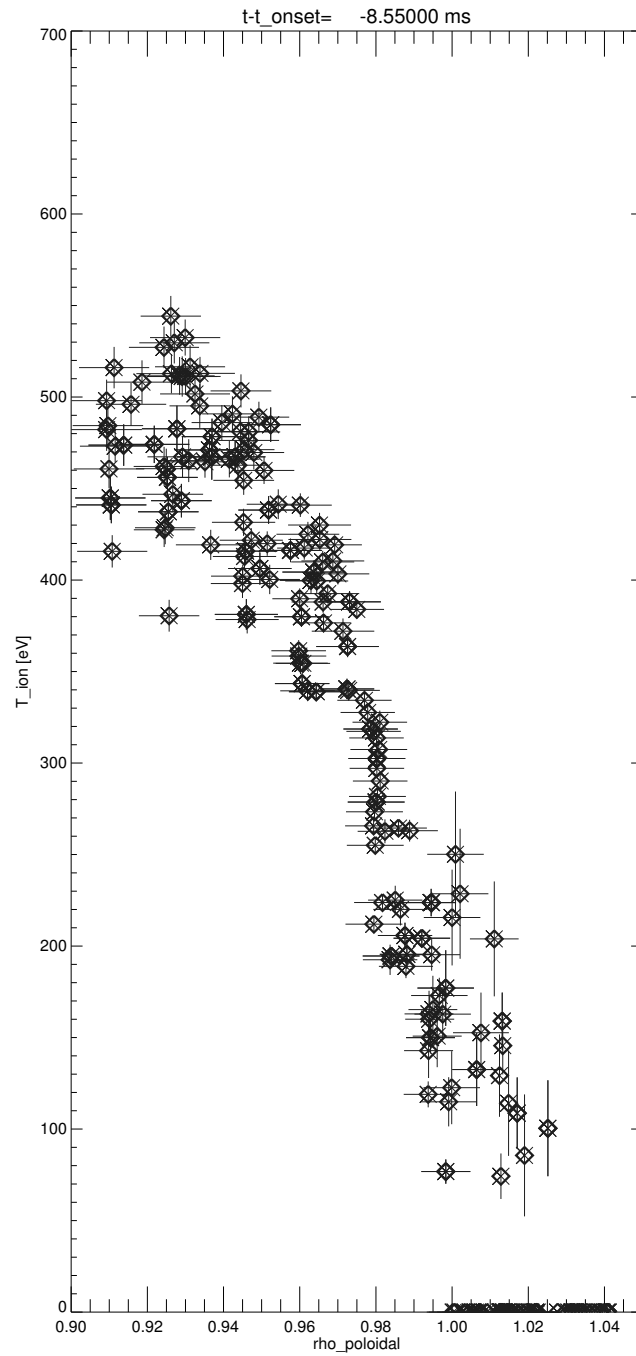
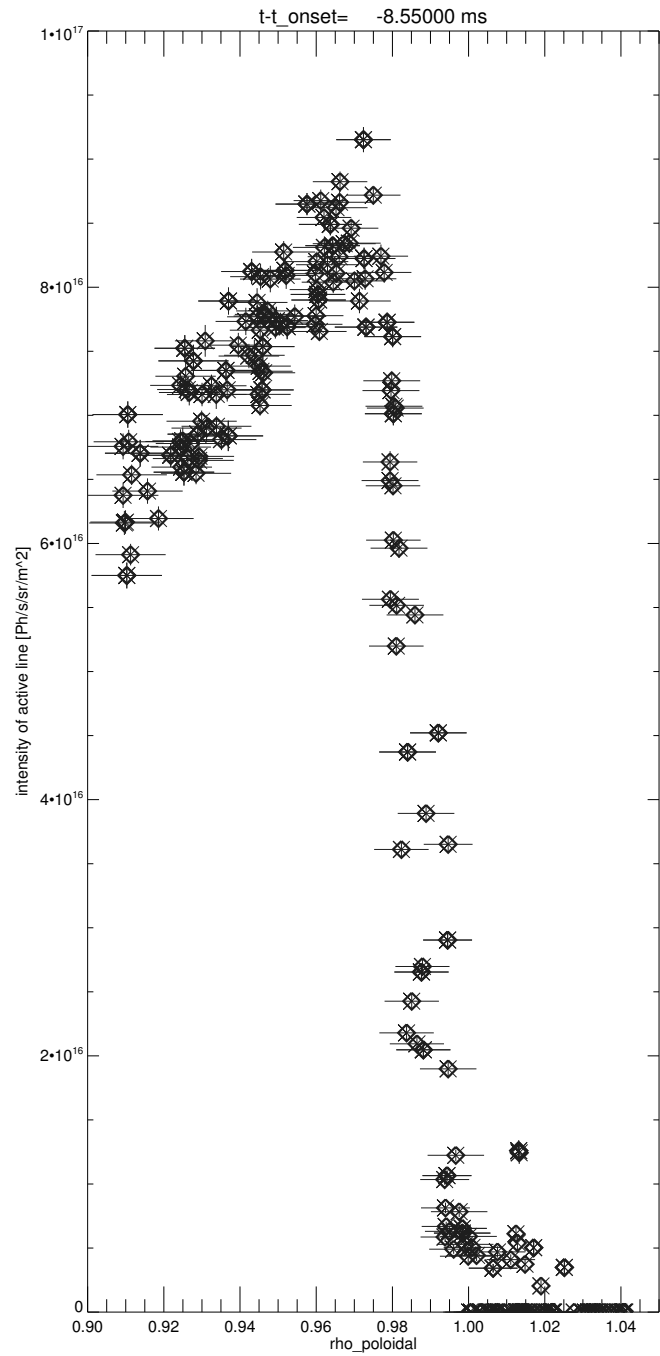


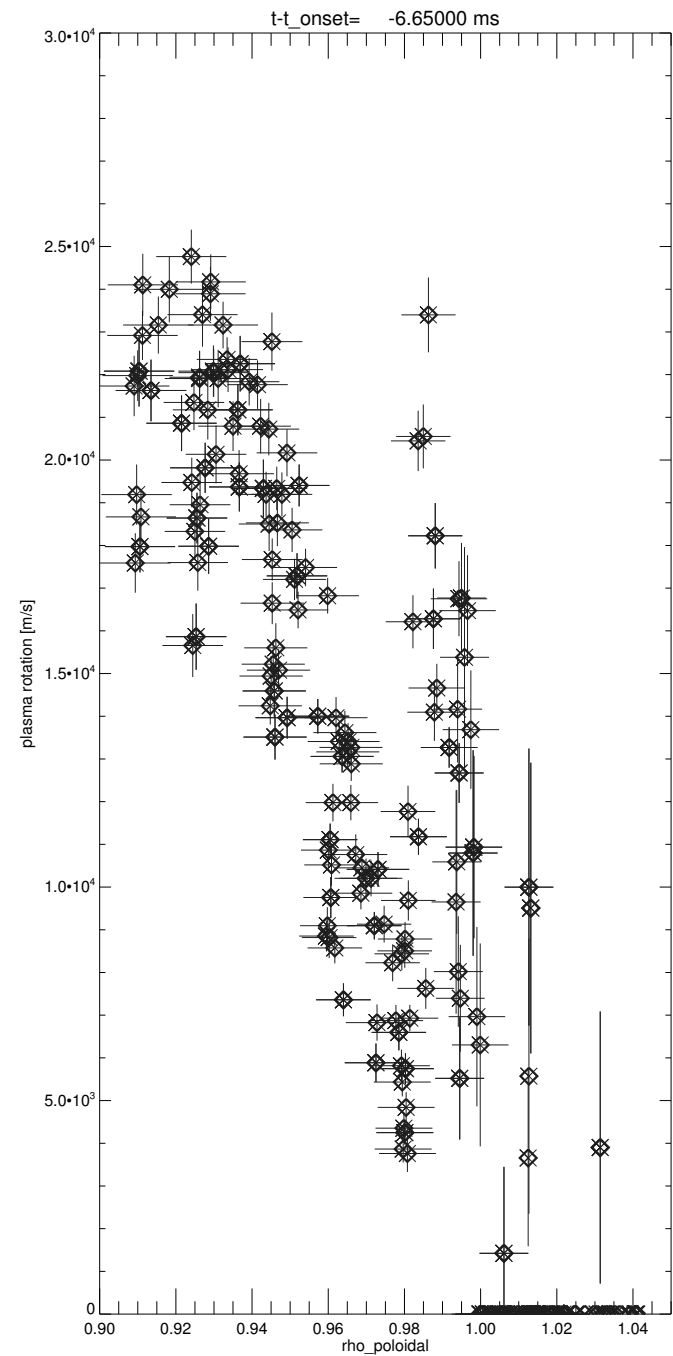
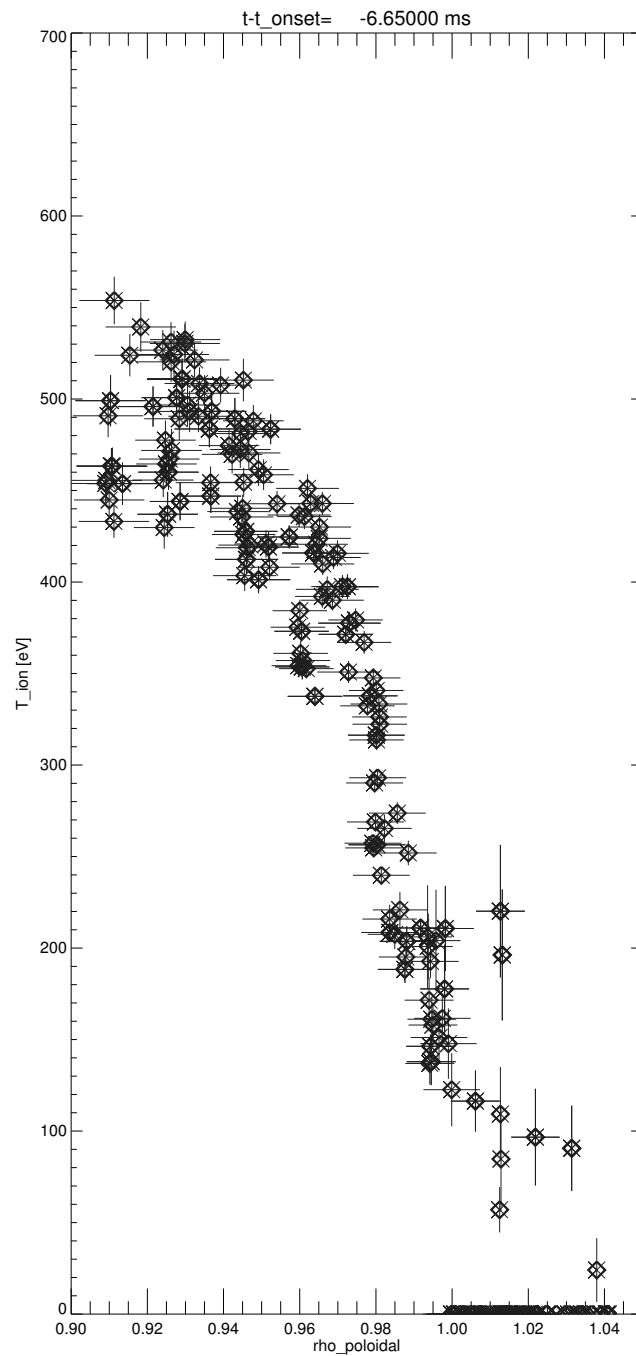
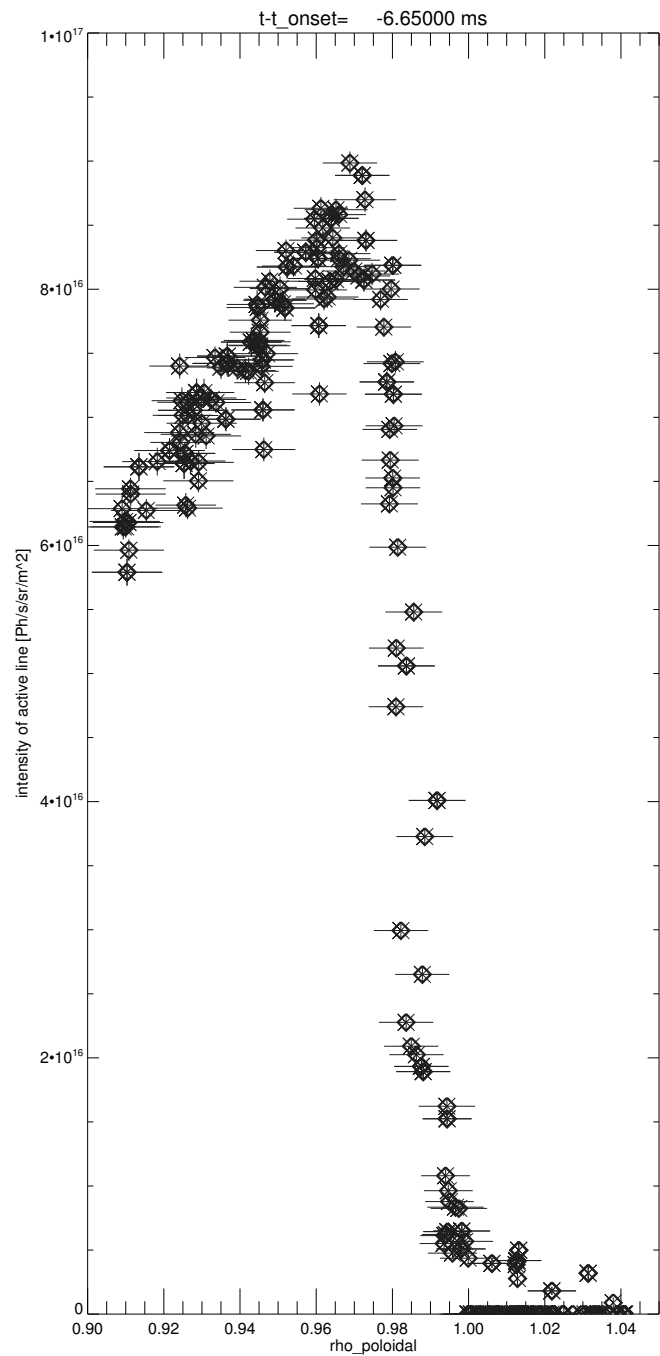


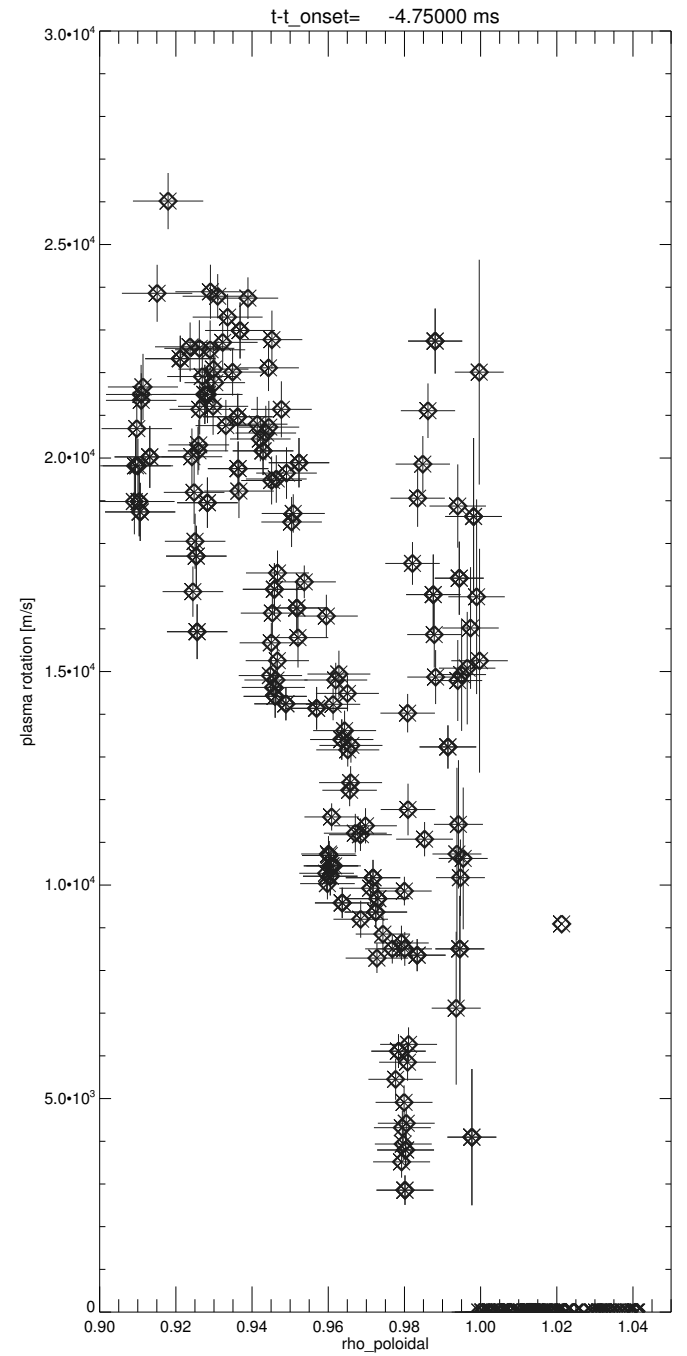
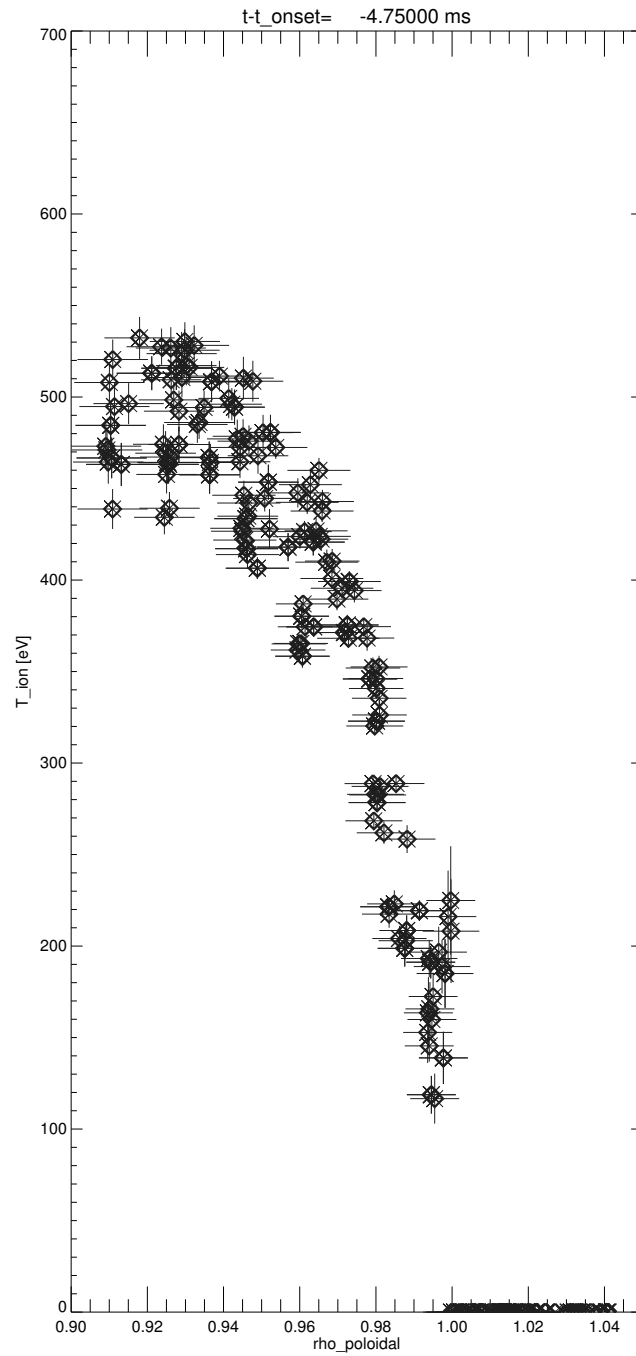
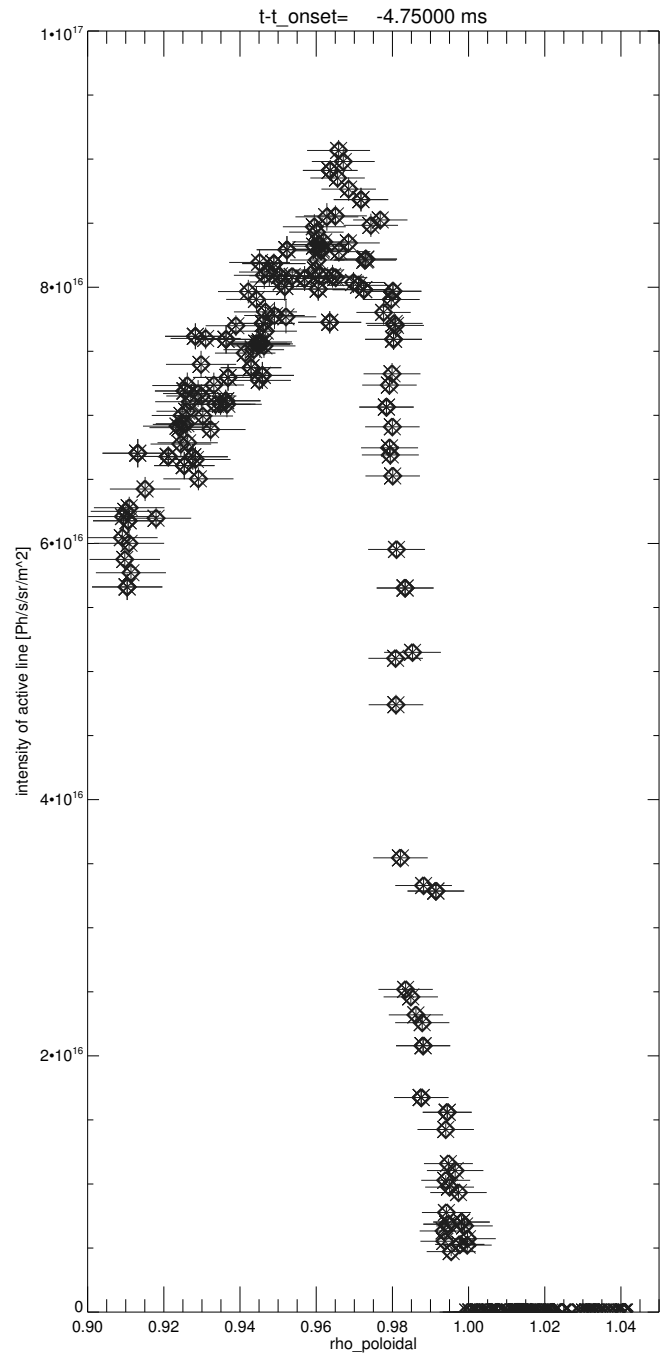


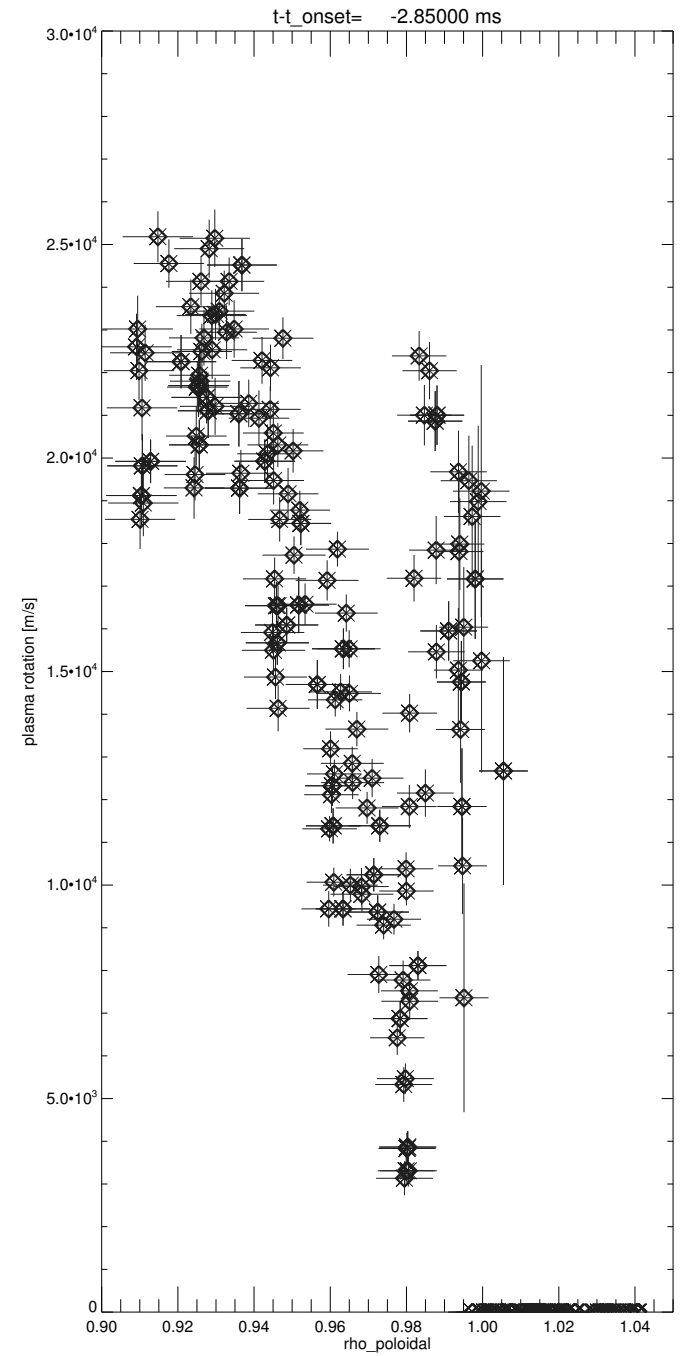
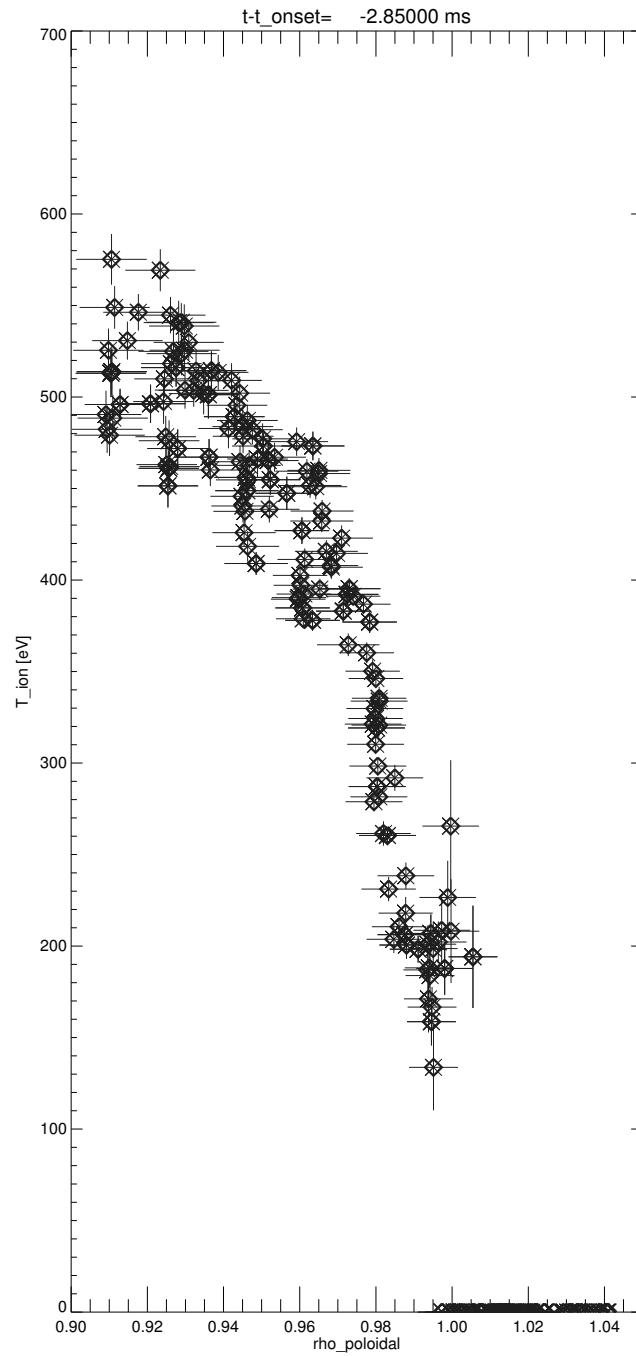
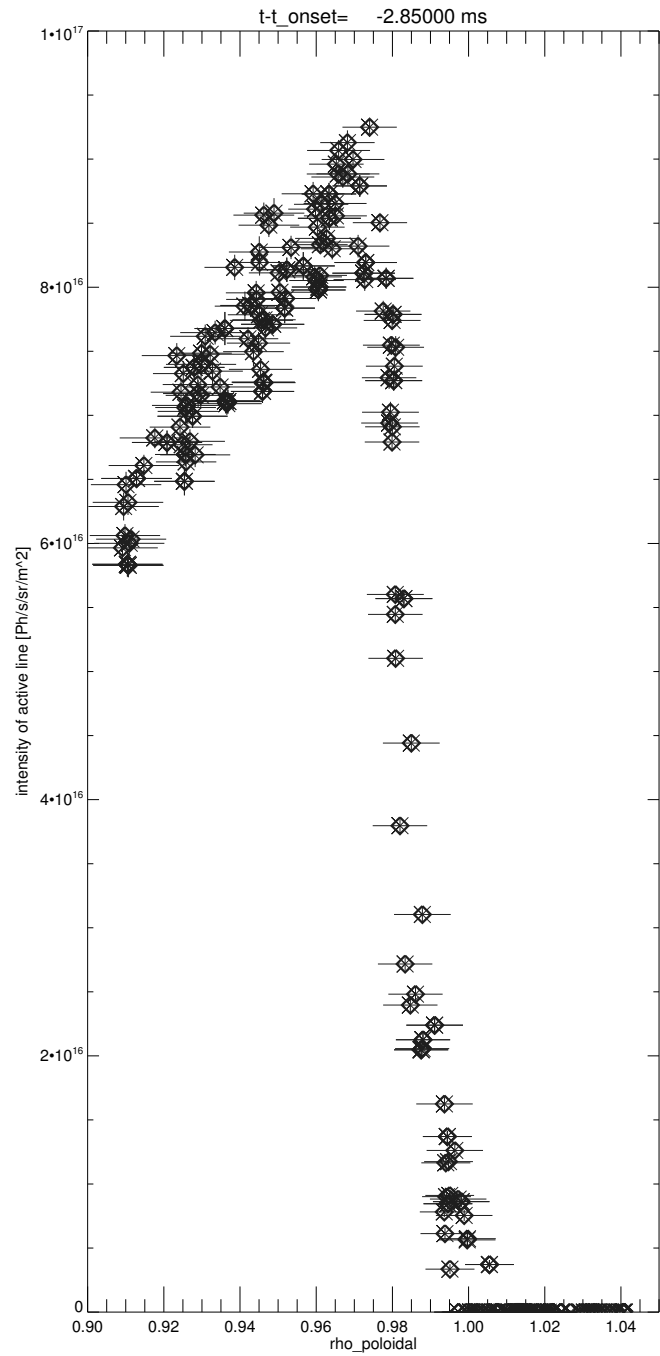


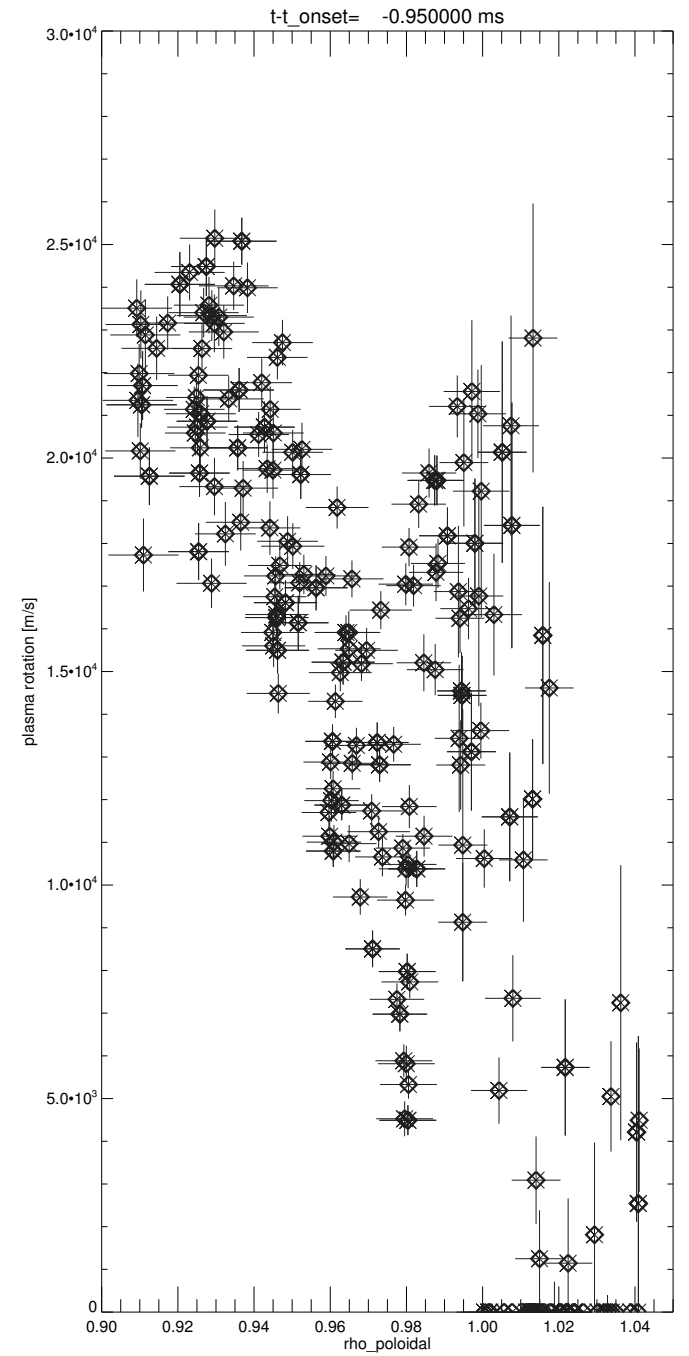
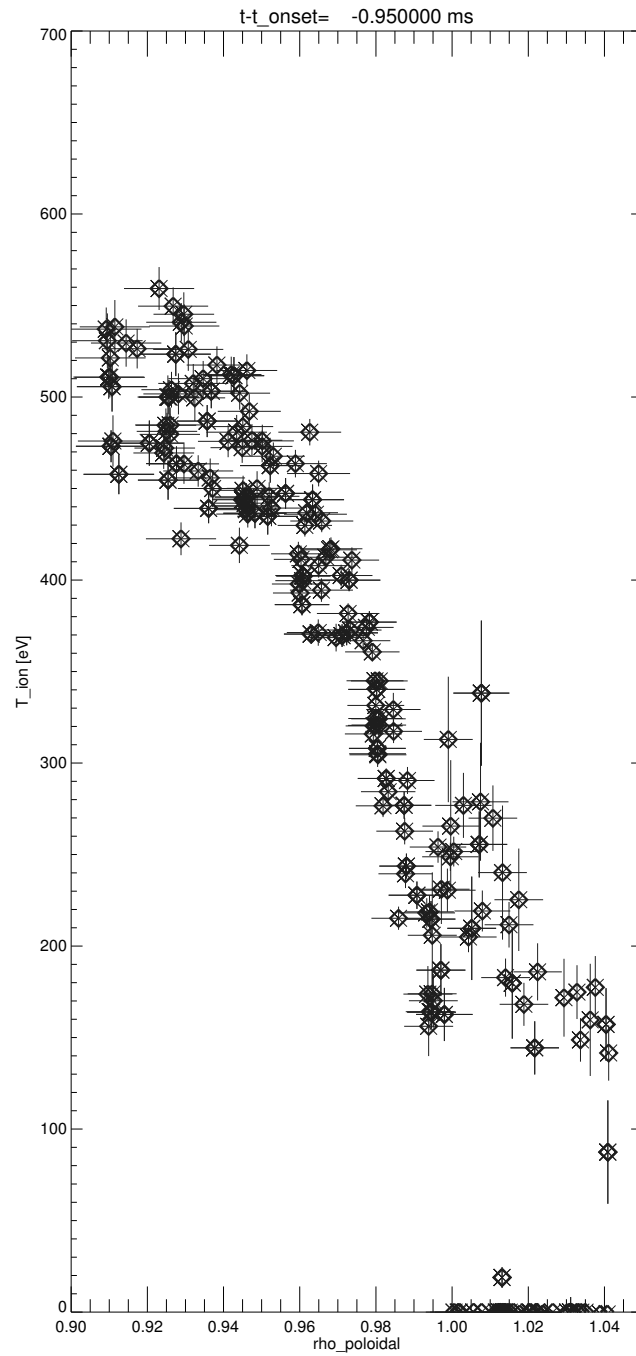
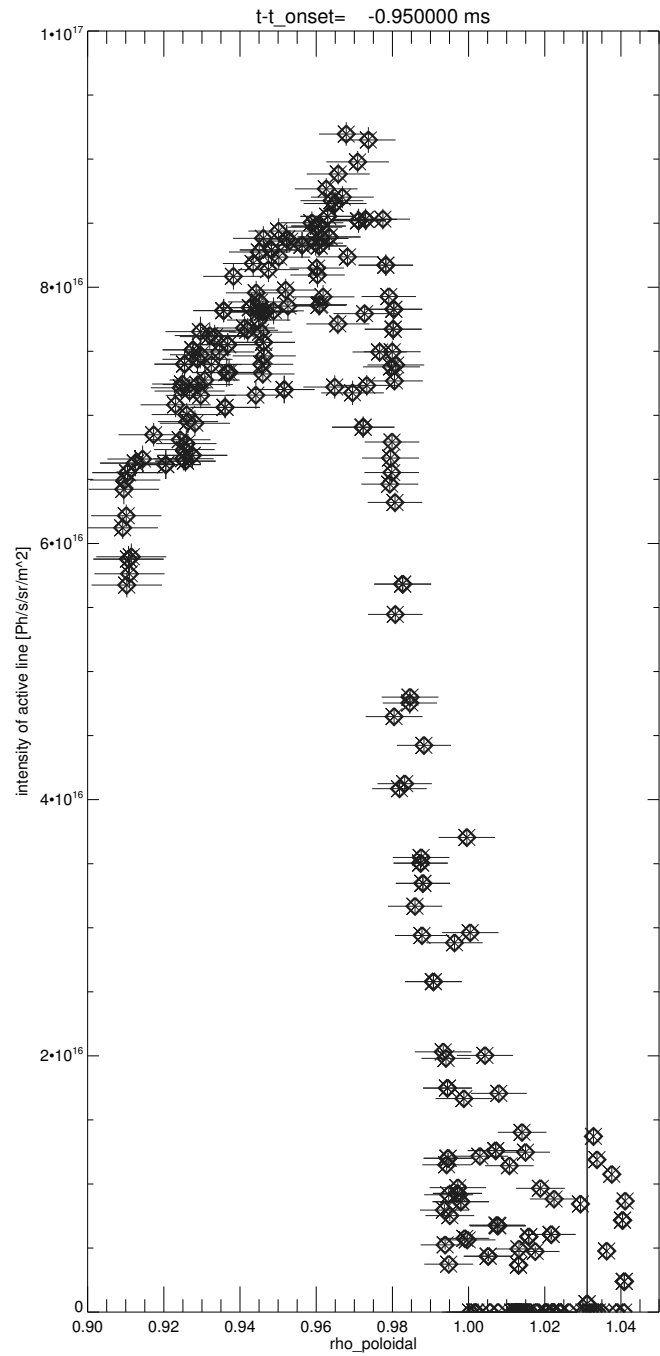


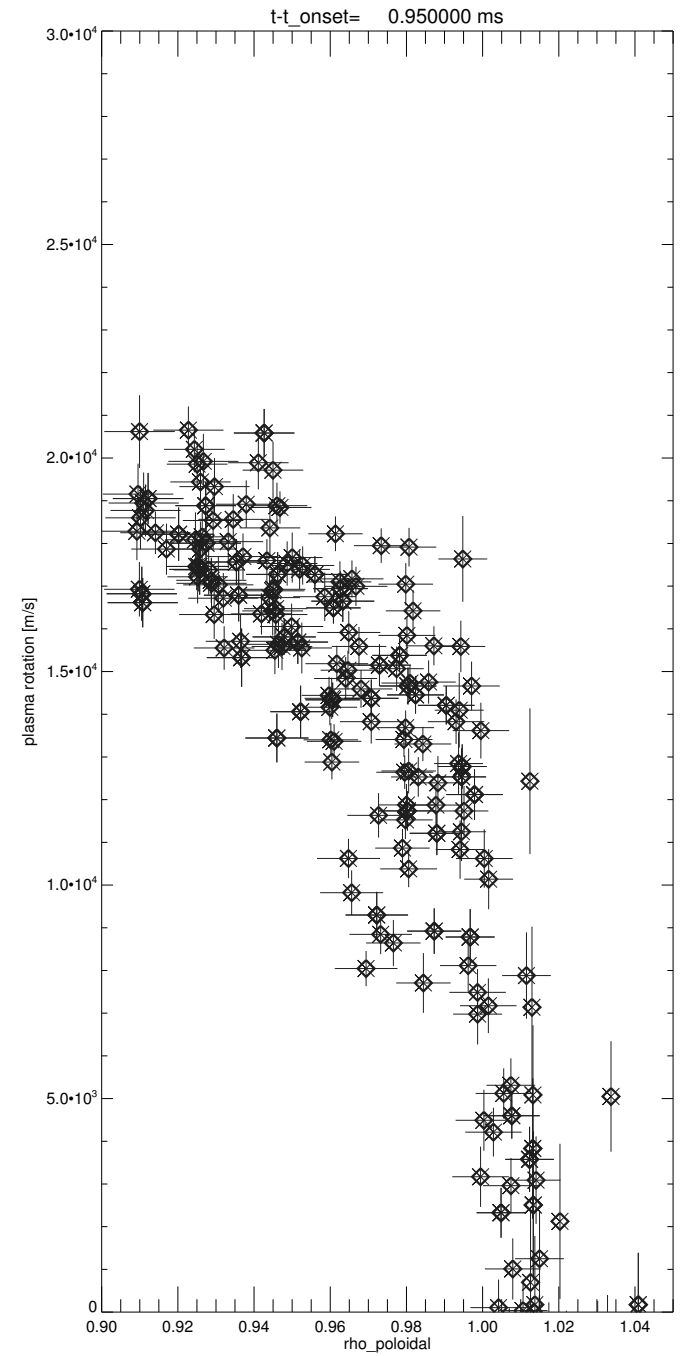
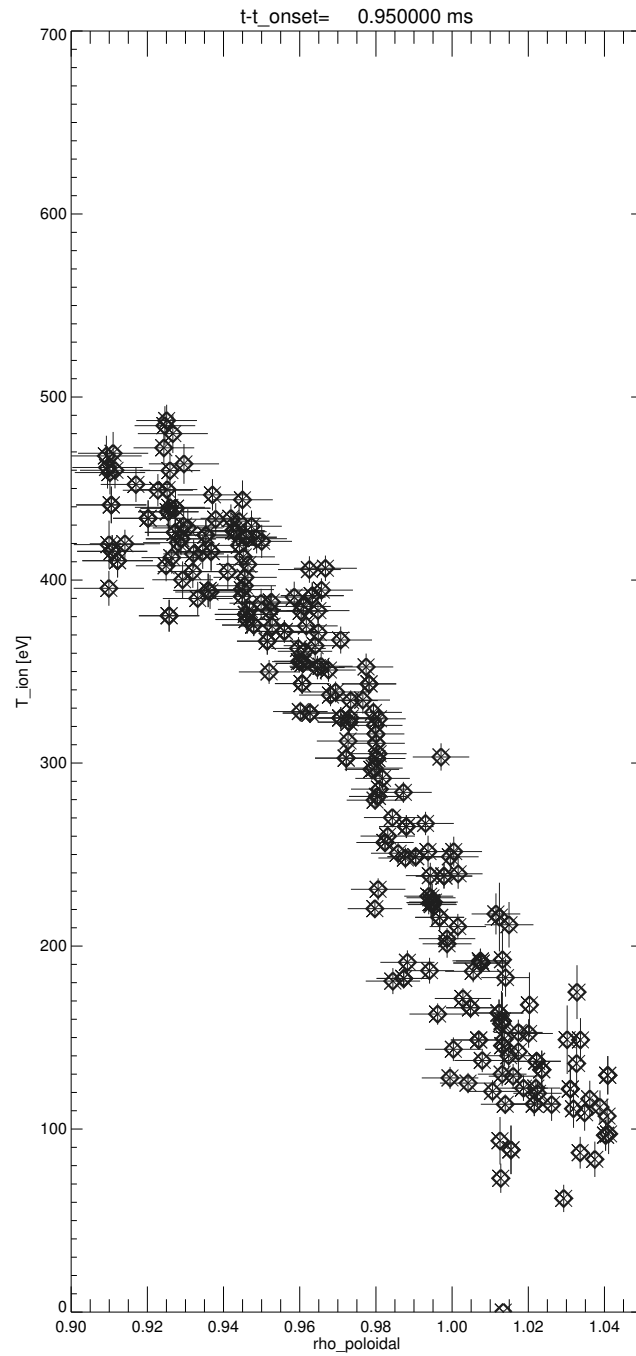
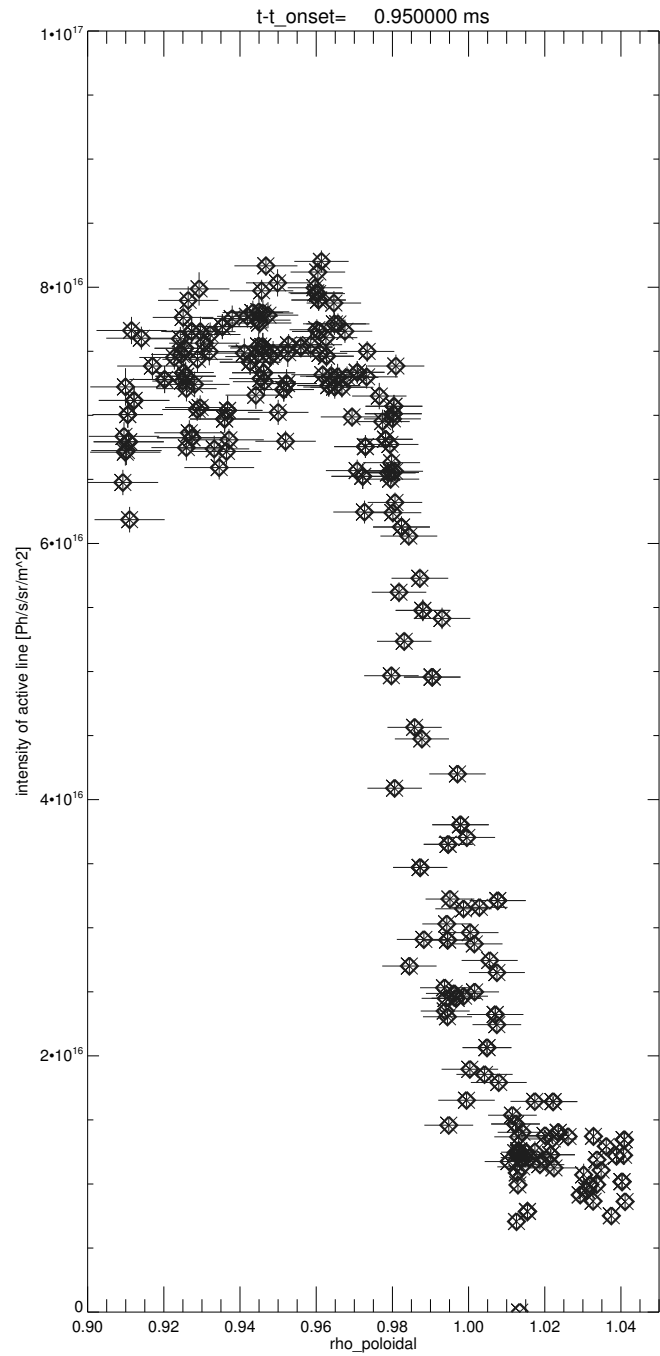


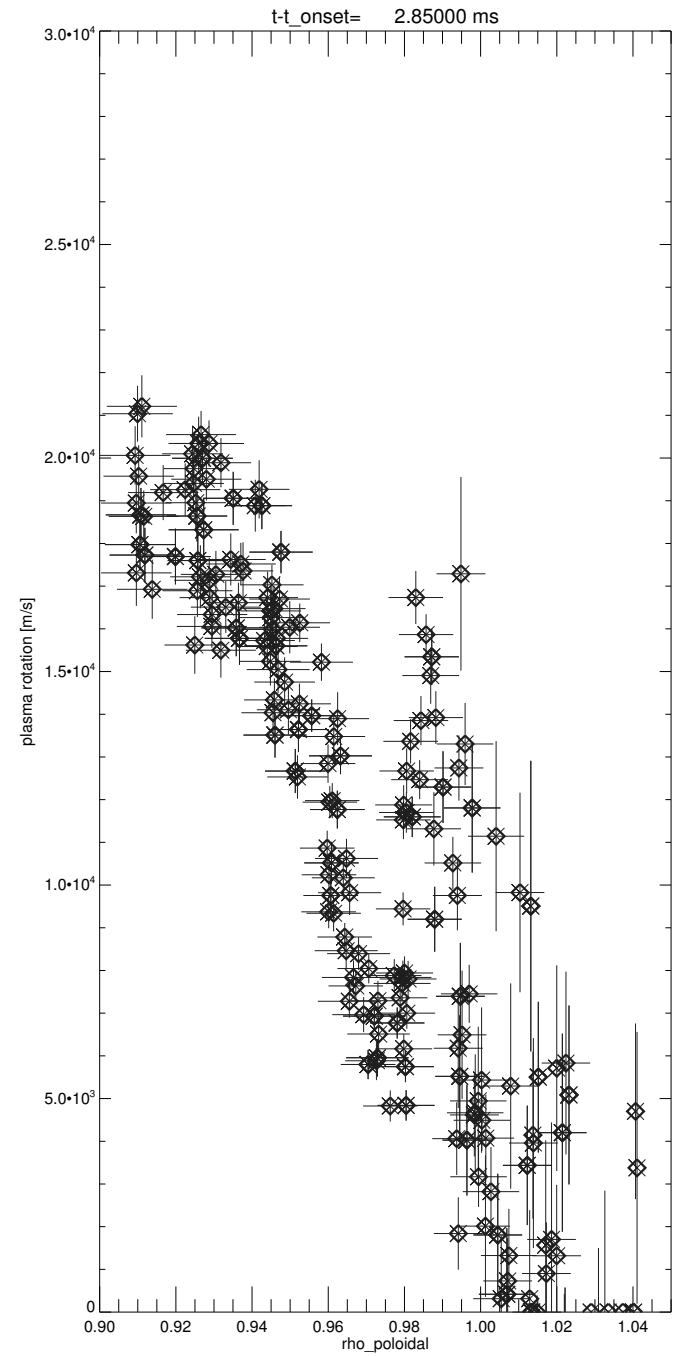
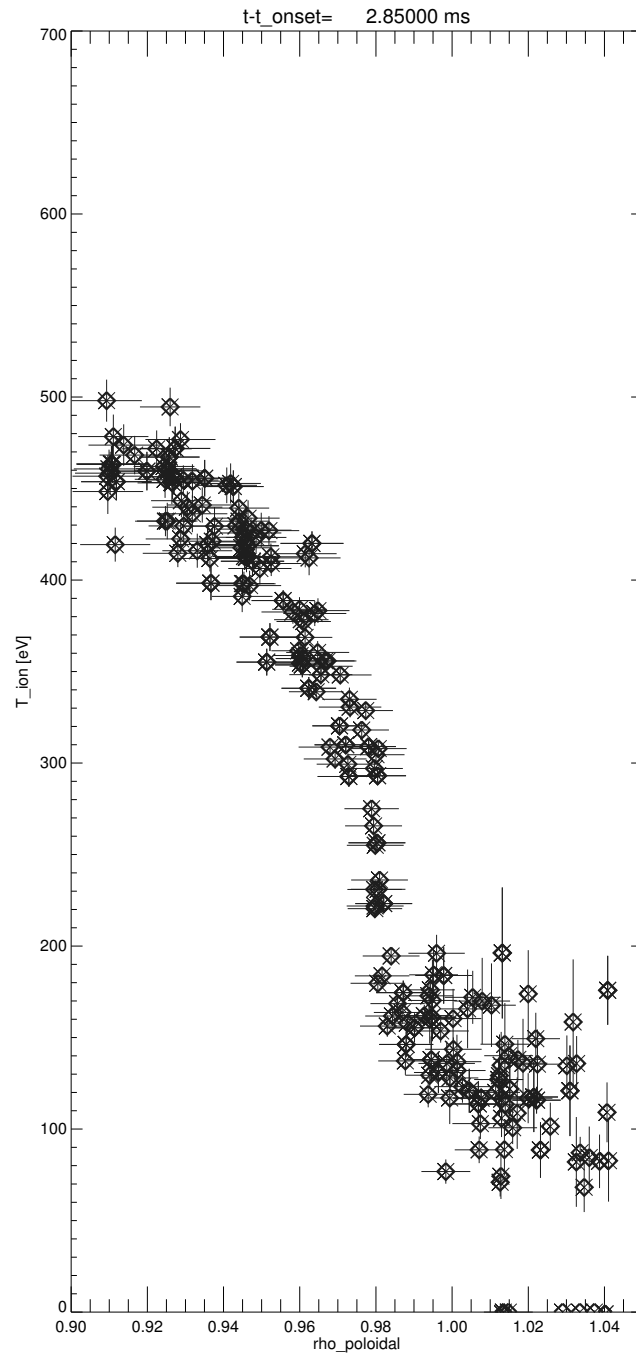
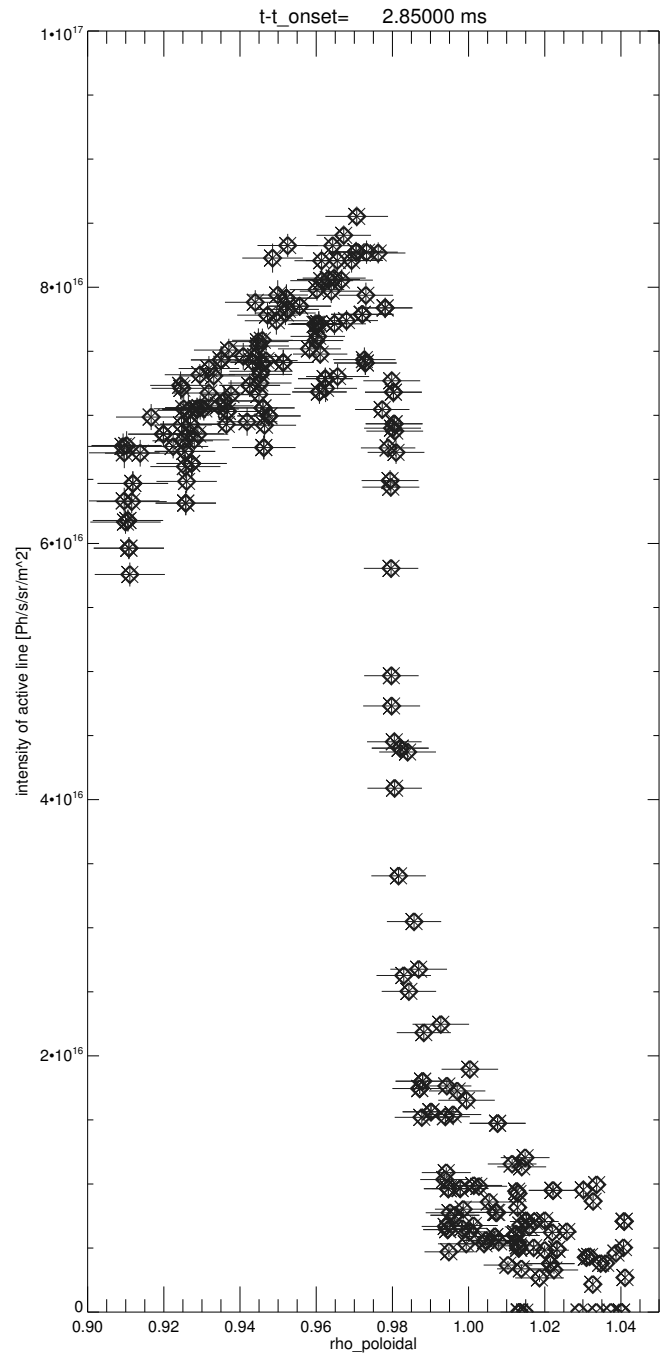


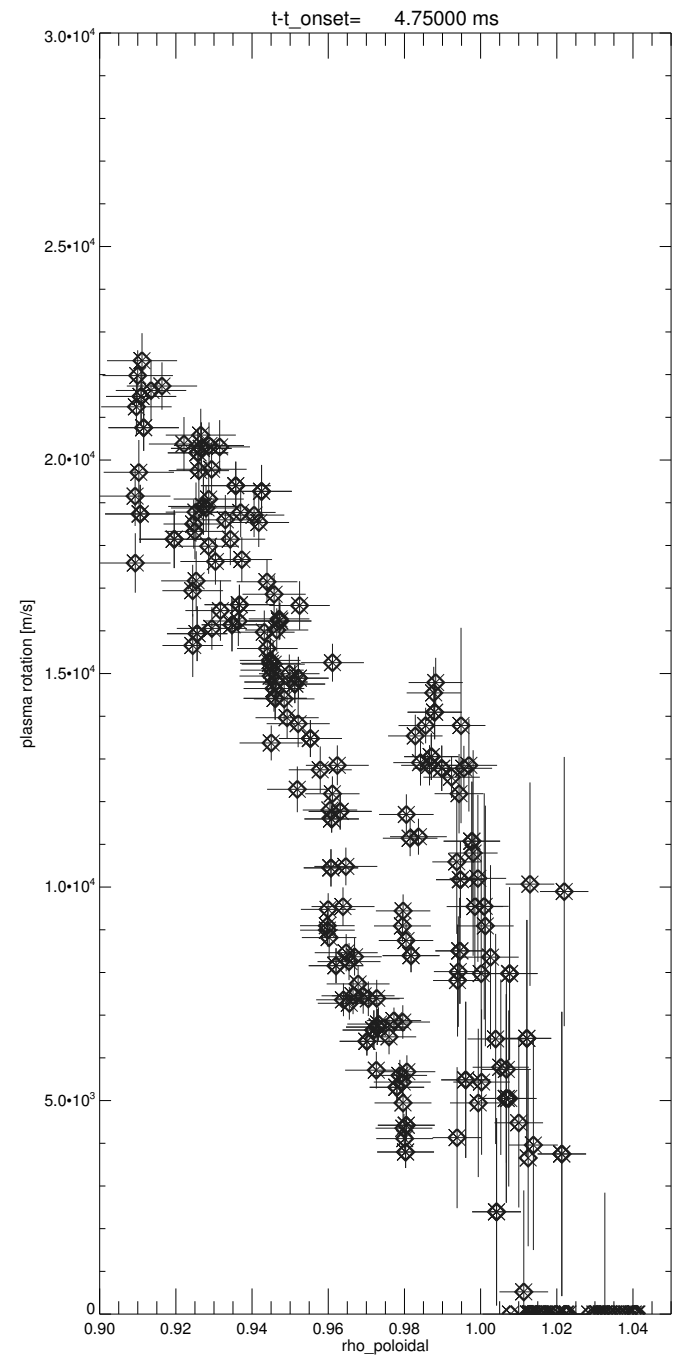
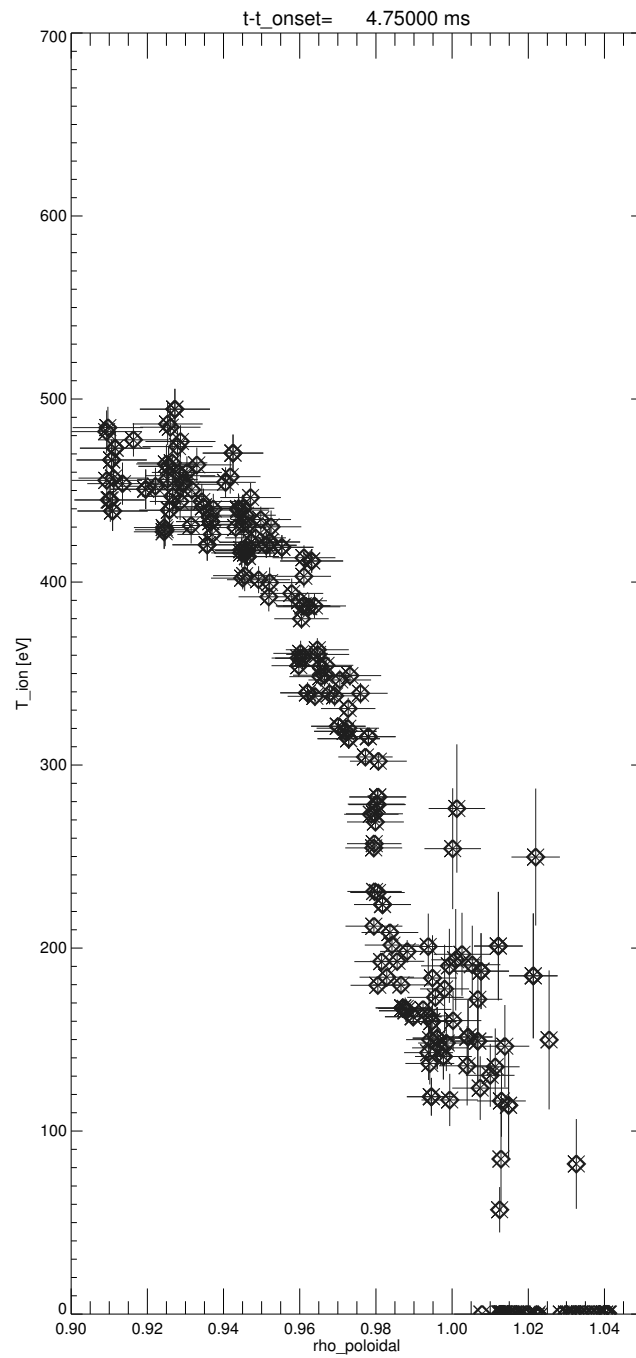
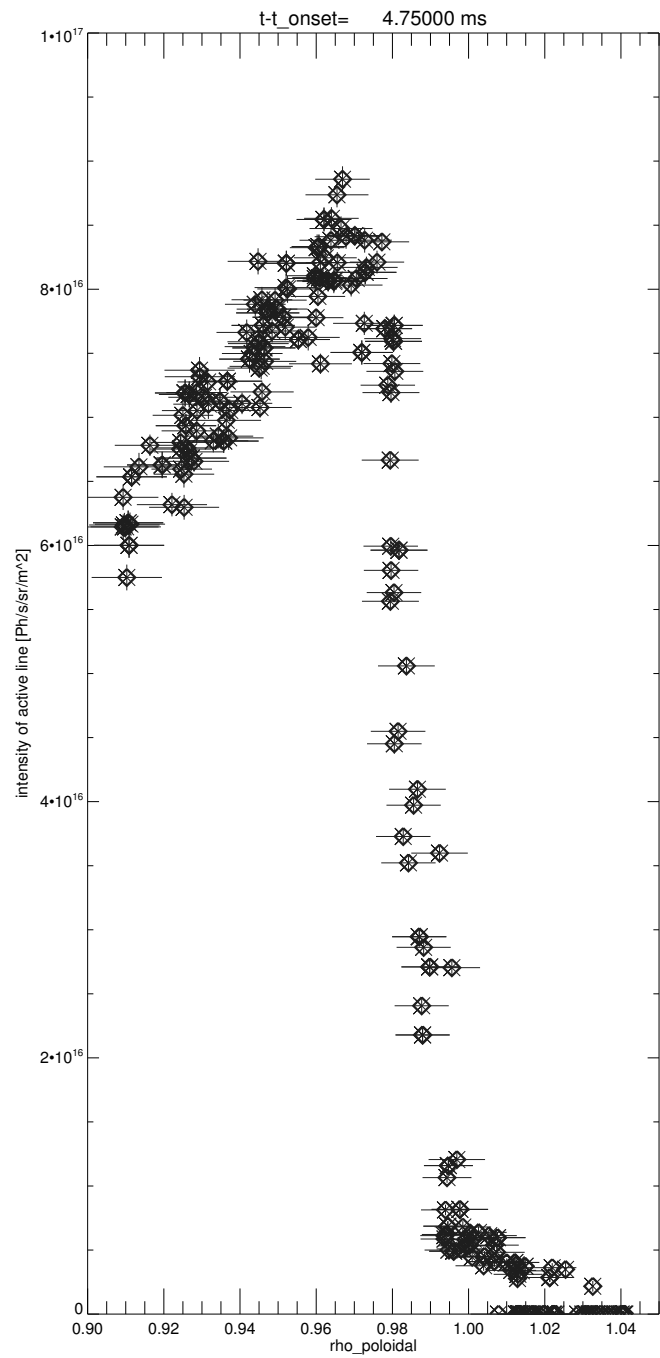


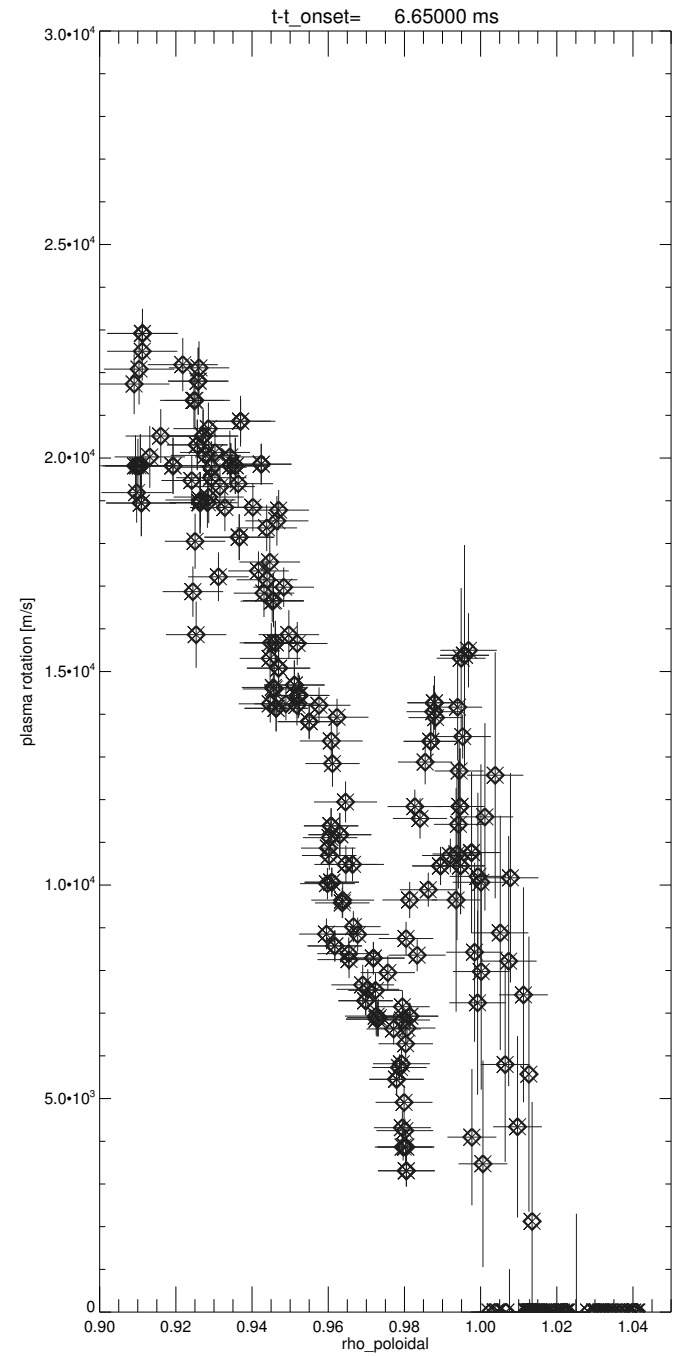
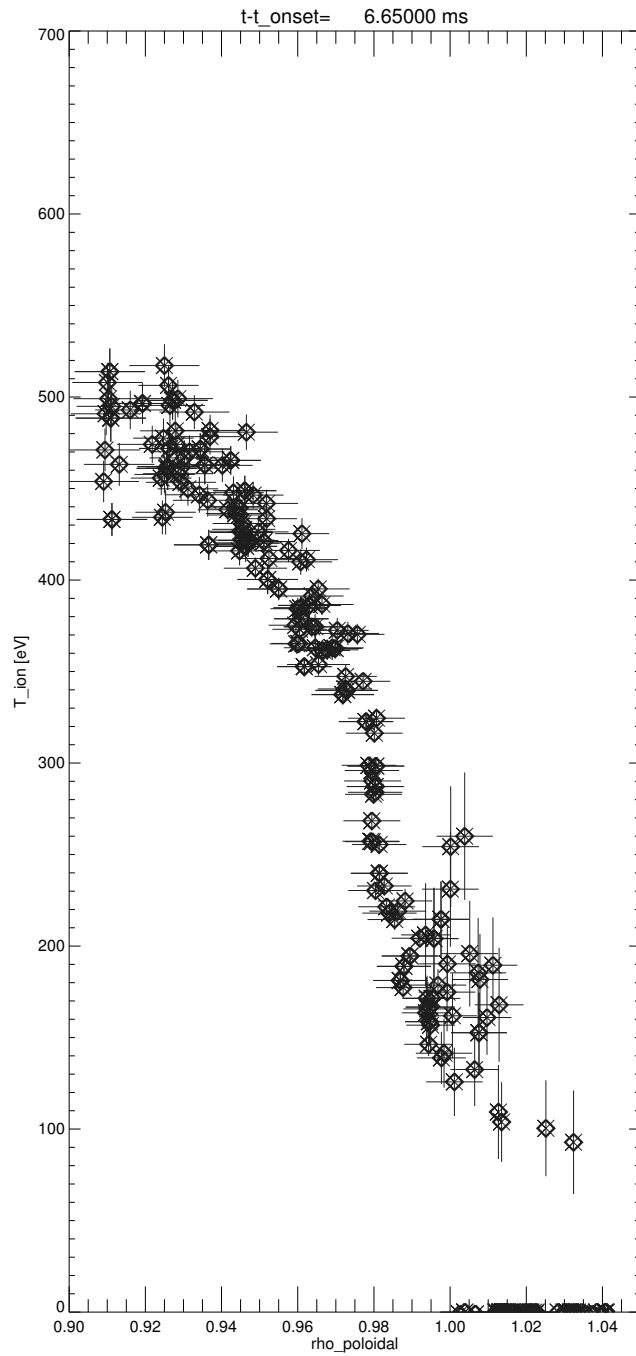
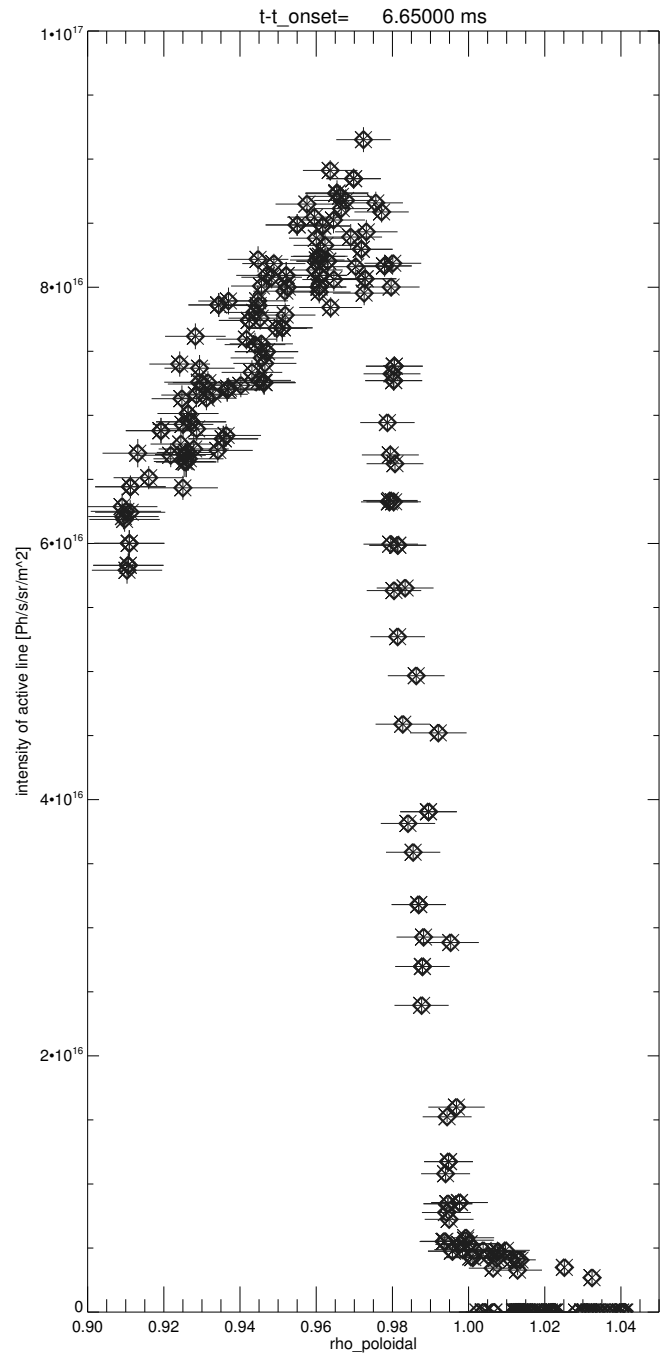


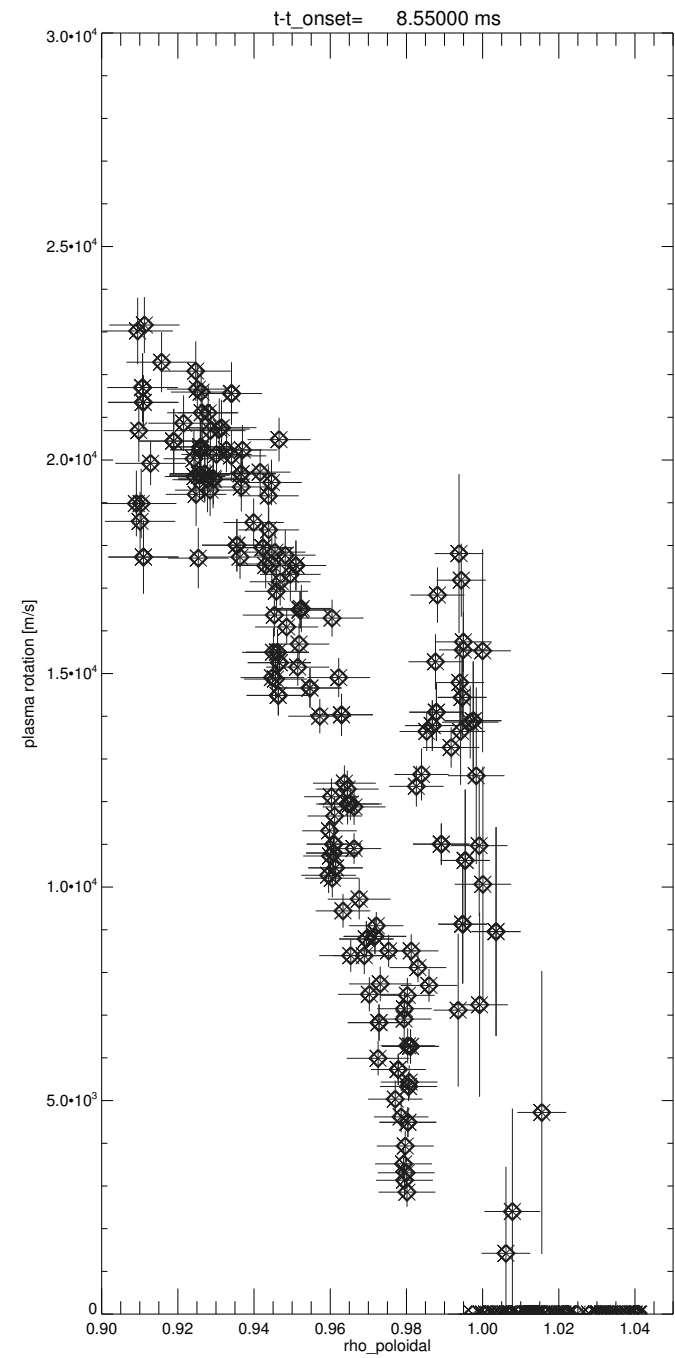
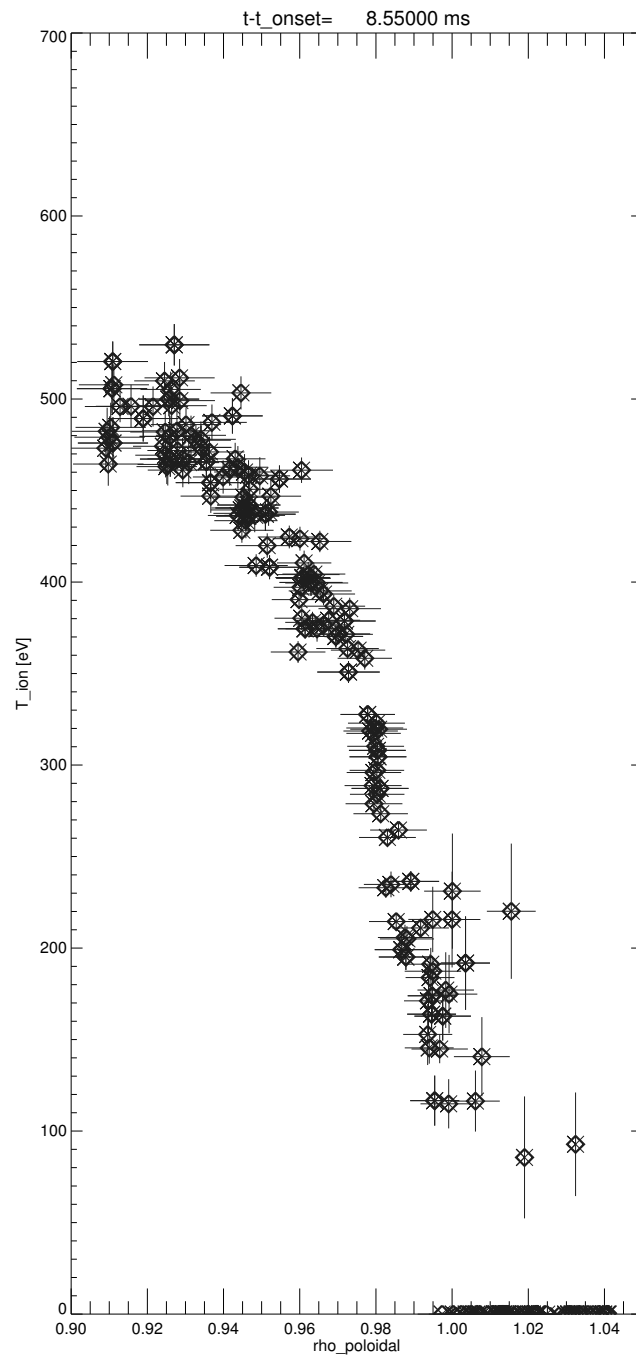
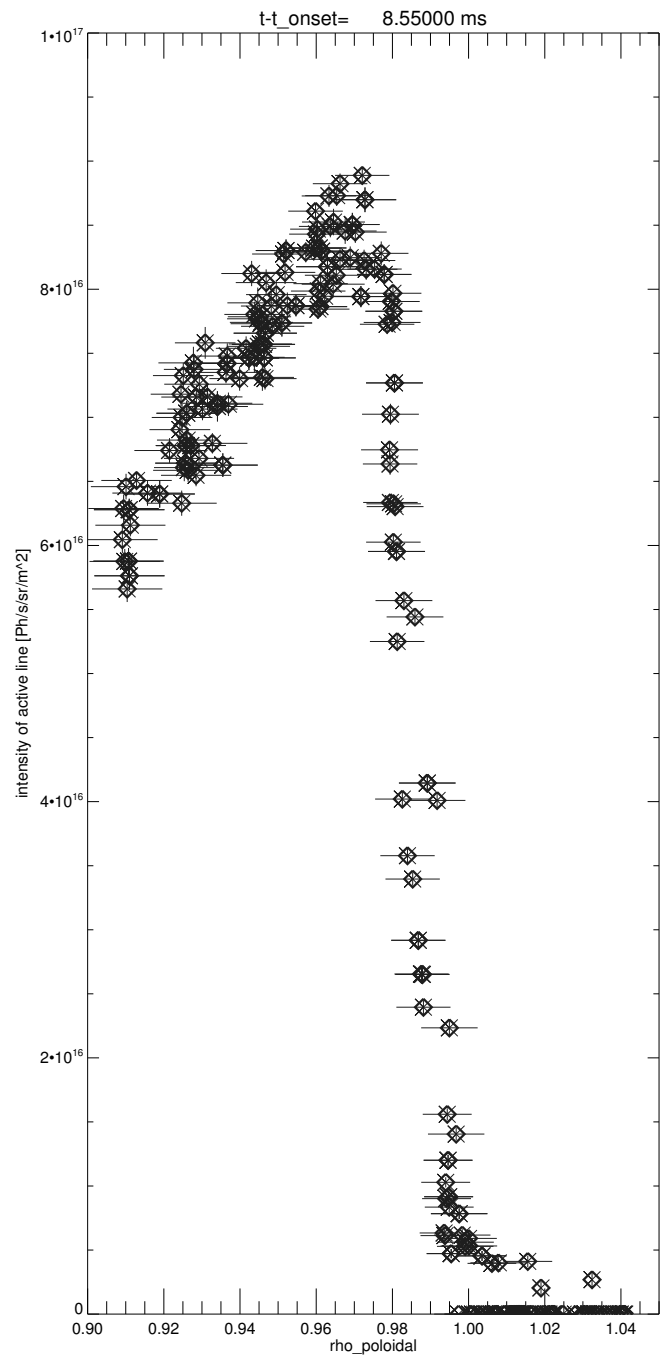


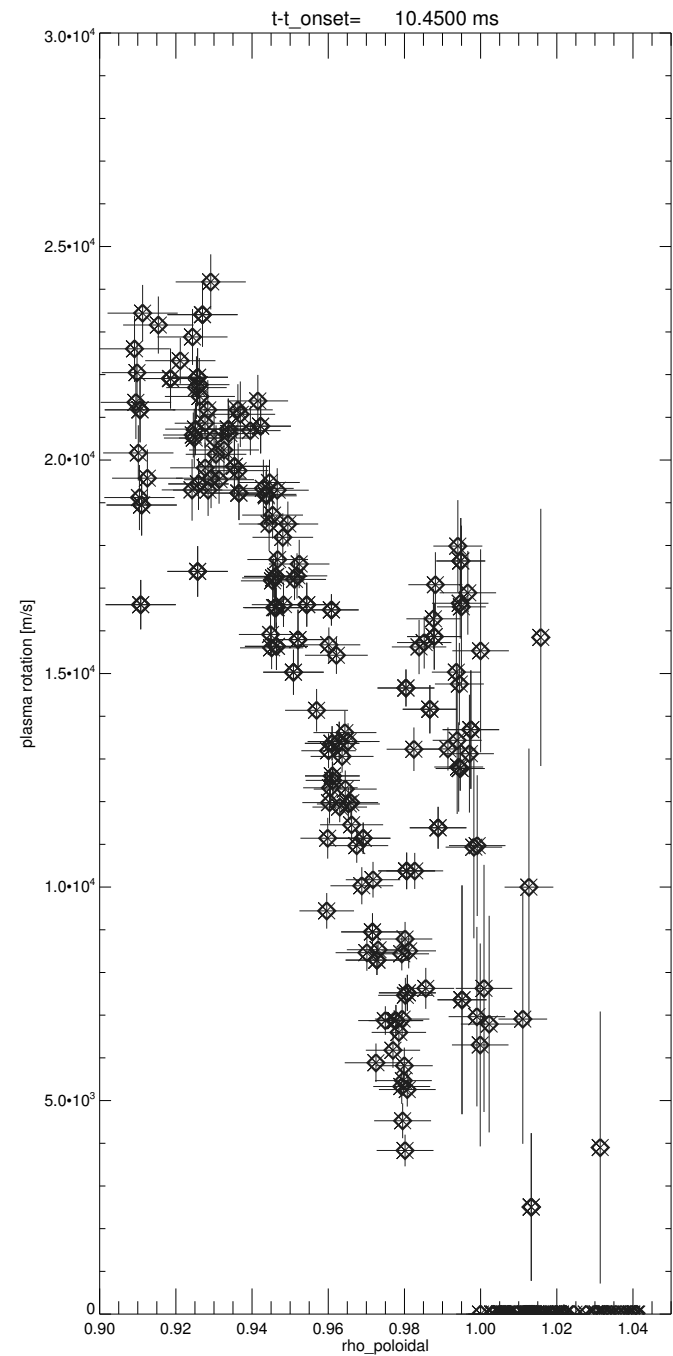
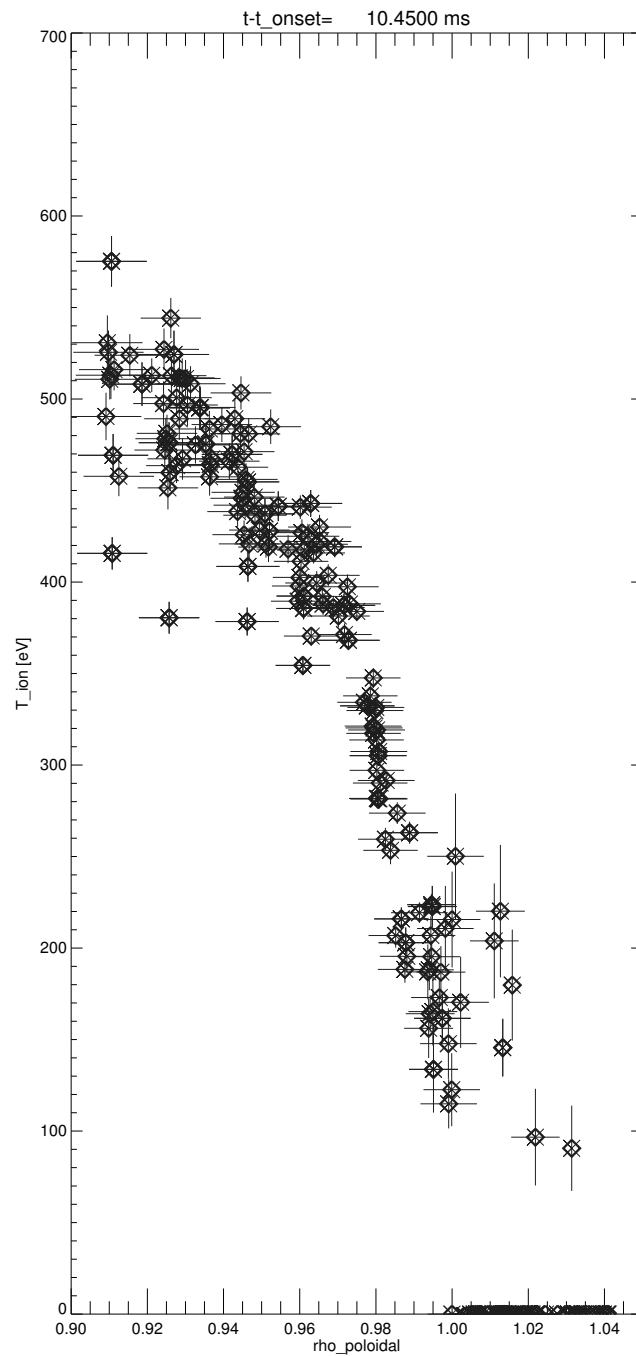
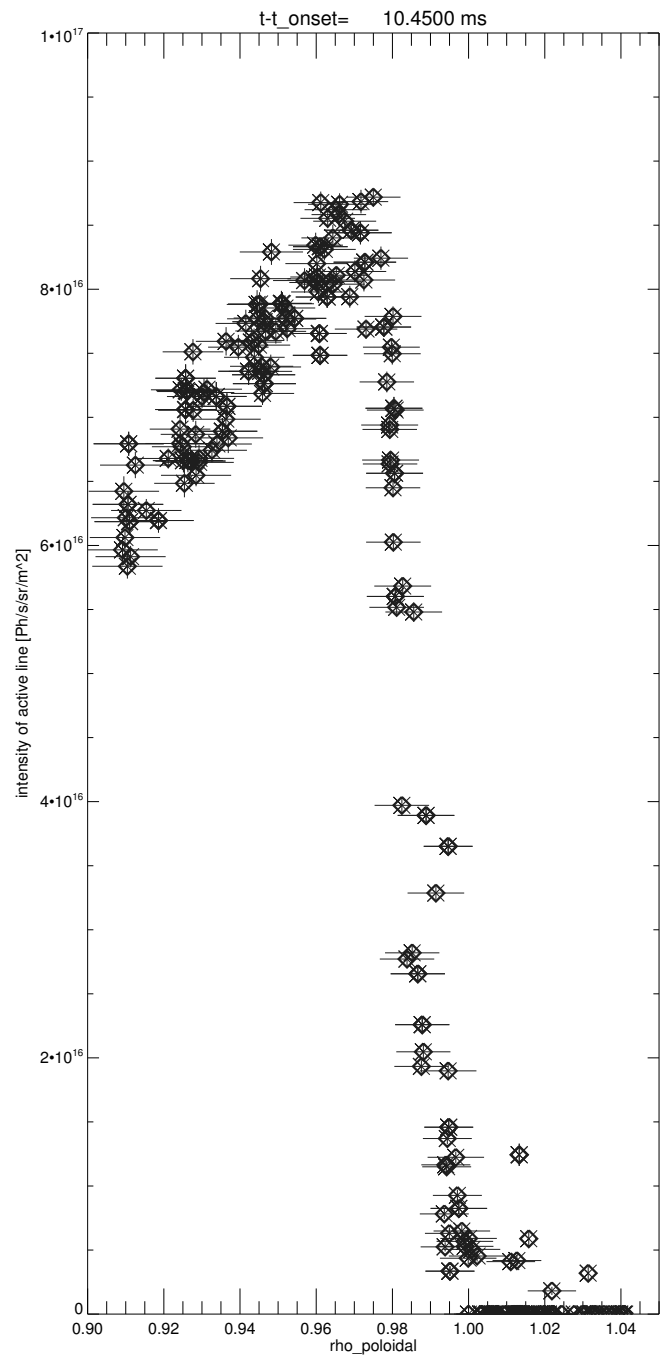












- new edge-CXRS diagnostic at ASDEX Upgrade
- Fast measurements (1.9ms) routinely available, high spatial resolution ($< 1\text{cm}$)
- ELM-cycle resolution possible

- Comparison between different impurities in detail
- Analysis of transport
- Support for evaluating radial electric field