

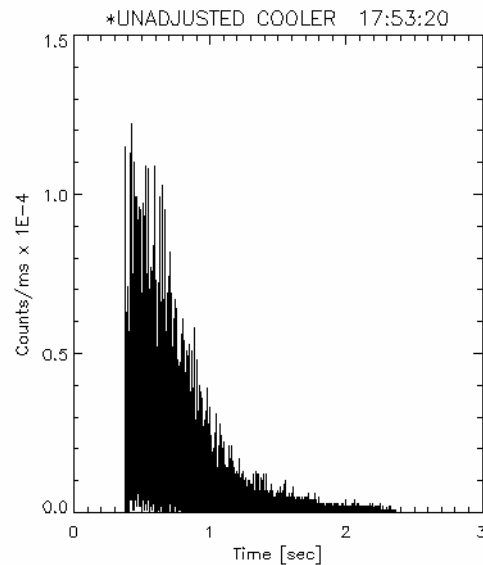
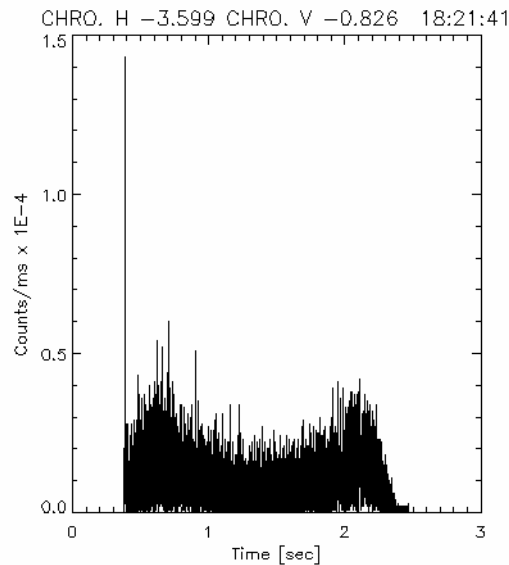
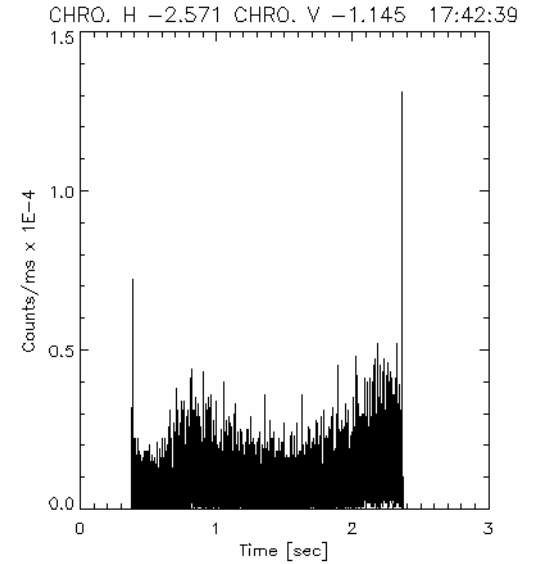
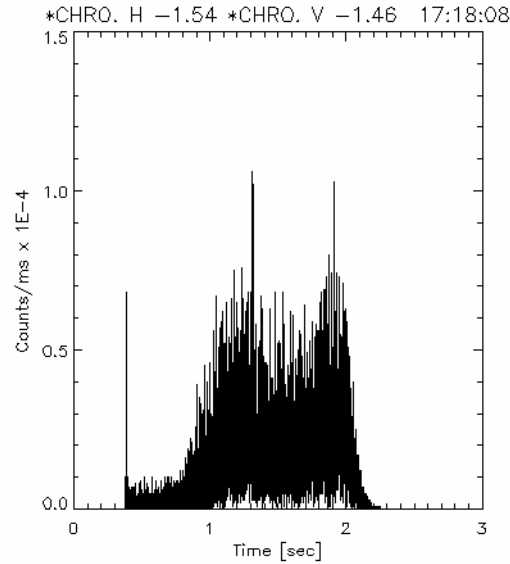
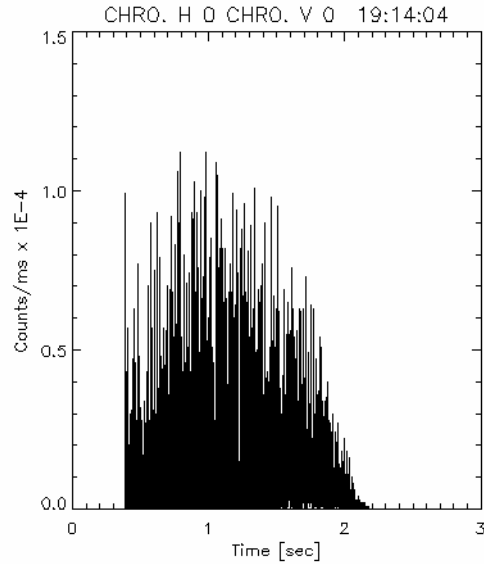
Spill structure measurements in SIS

M. Kirk, P. Forck

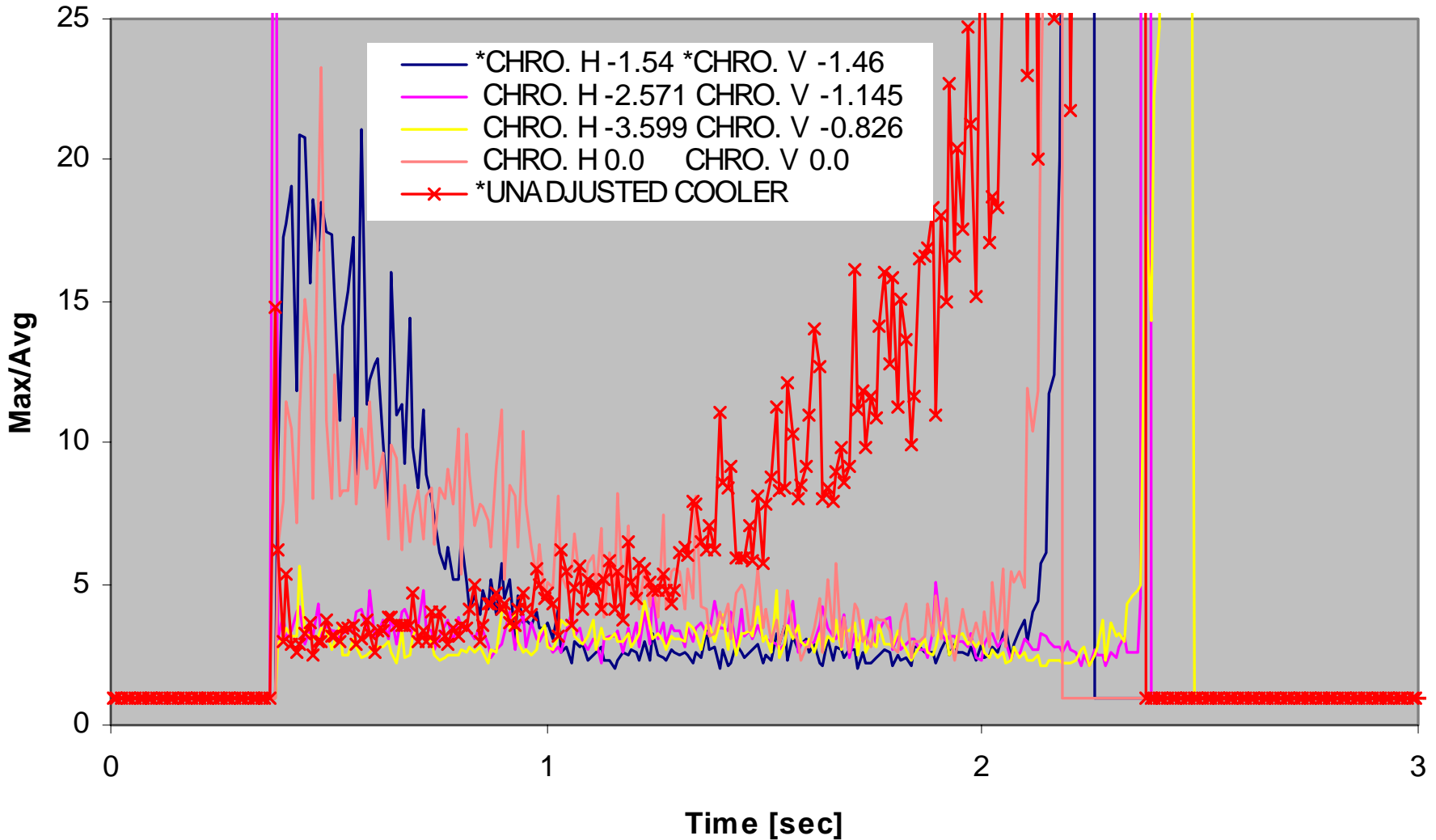
21 June 2005

- Corrected chromaticity (extraction)
- Electron cooling
- Cooler aligned/misaligned
- No RF

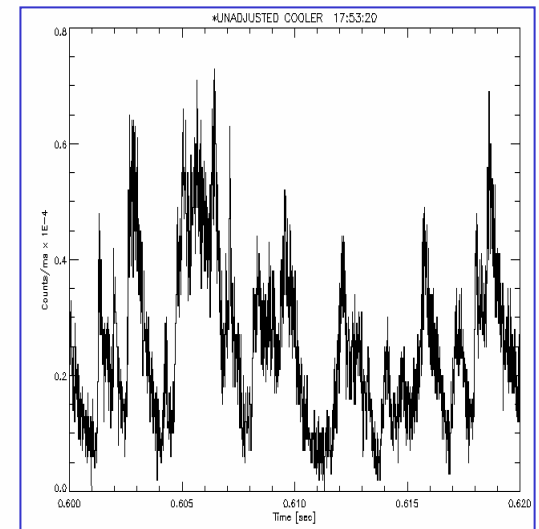
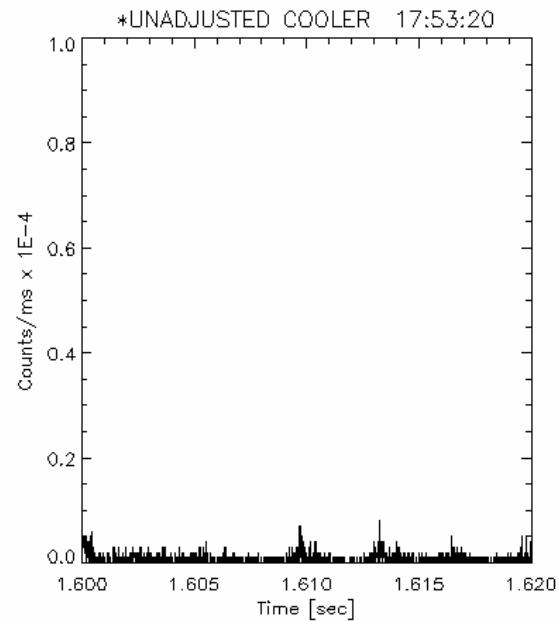
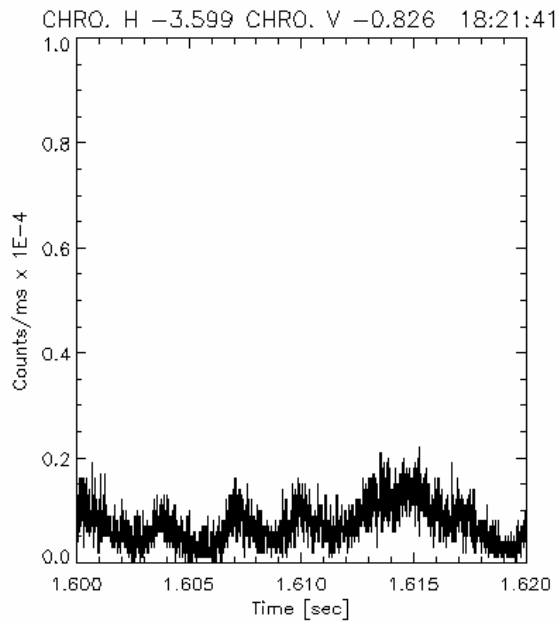
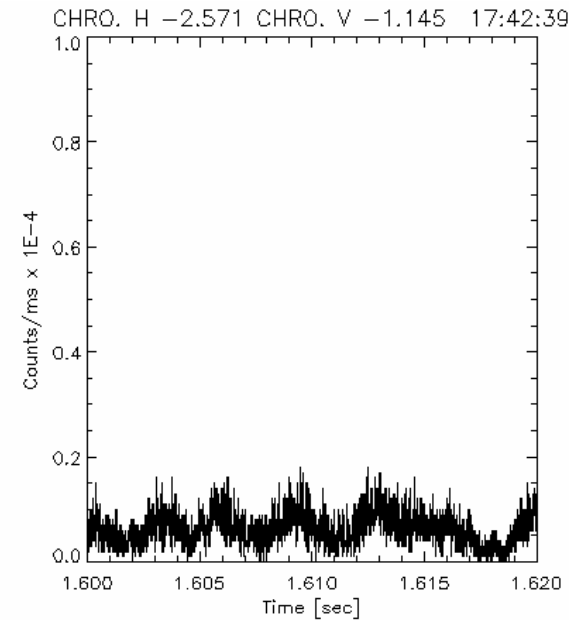
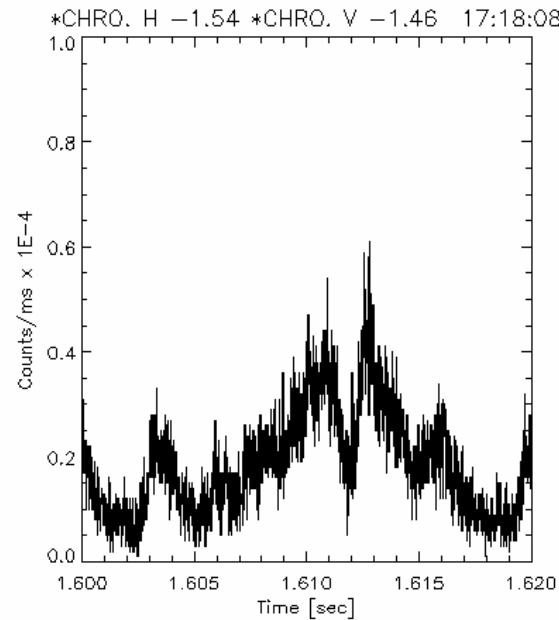
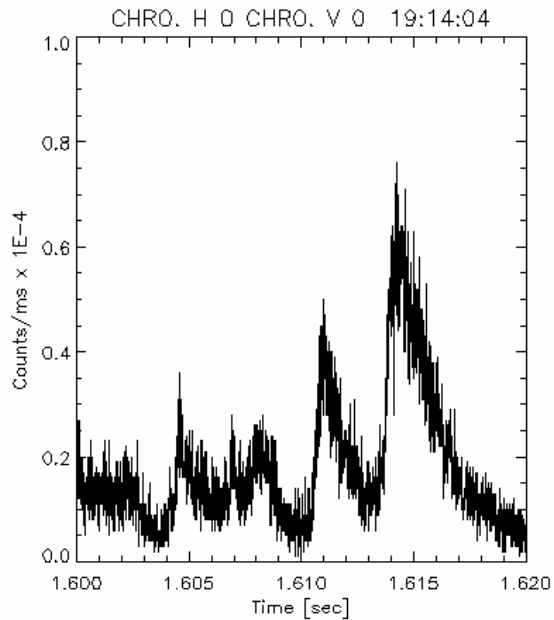
Spills for different chromaticities

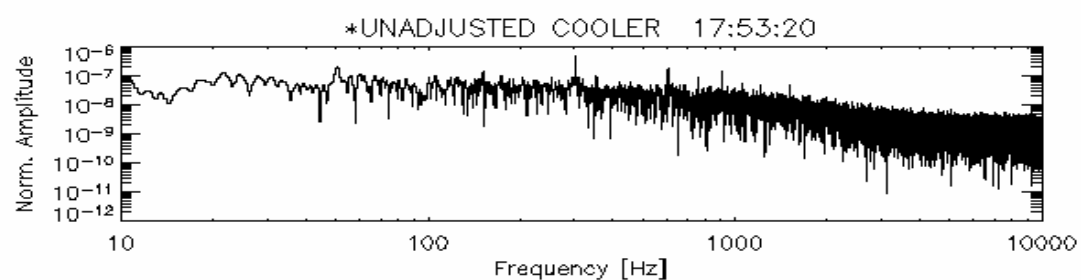
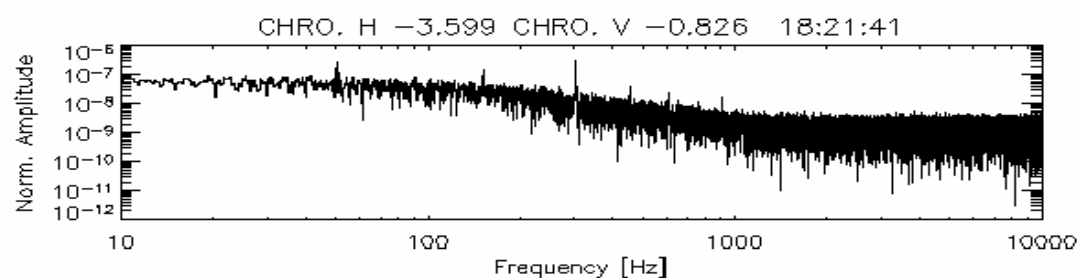
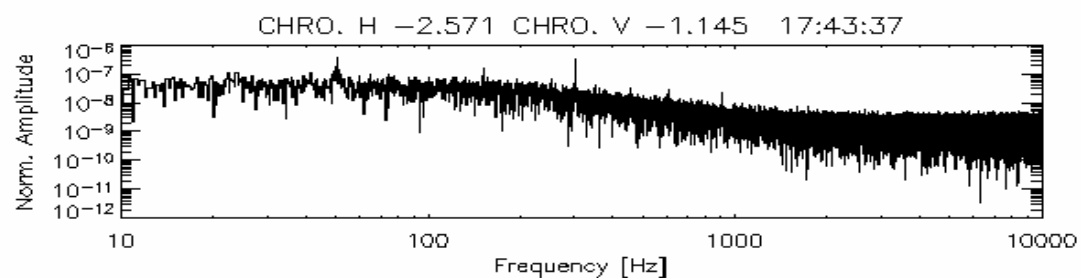
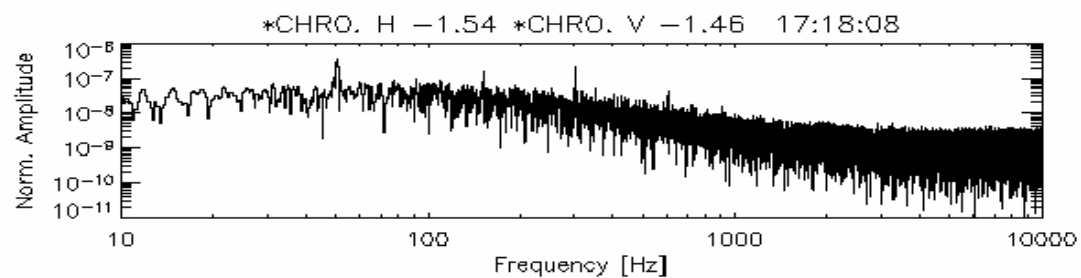
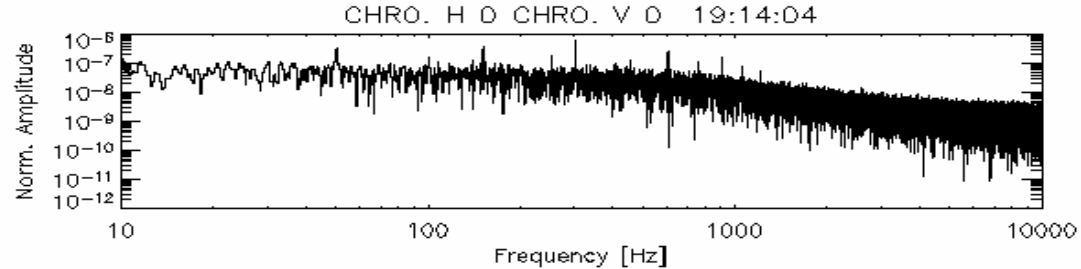


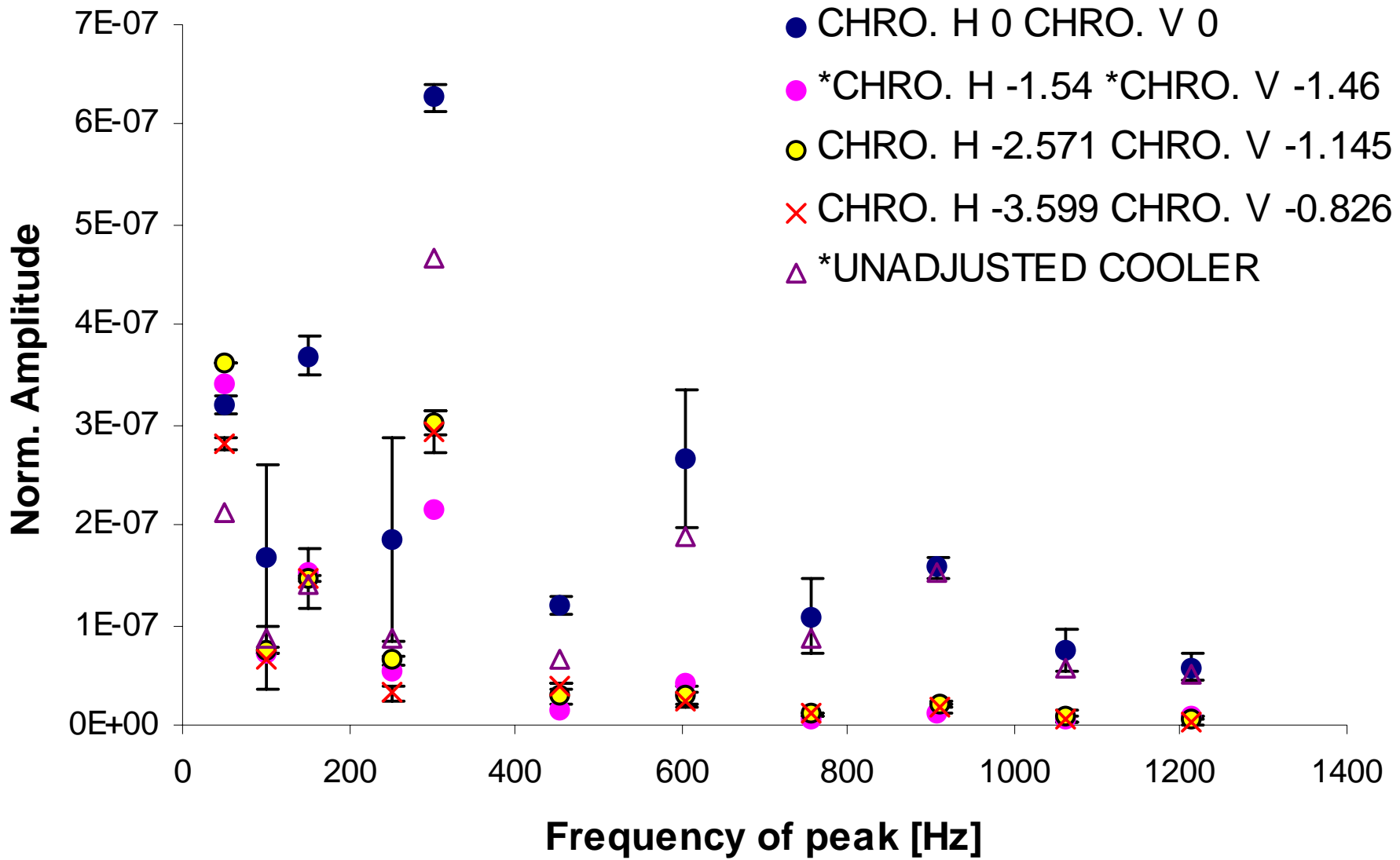
Quality factor in the spill



Zooms on the spills

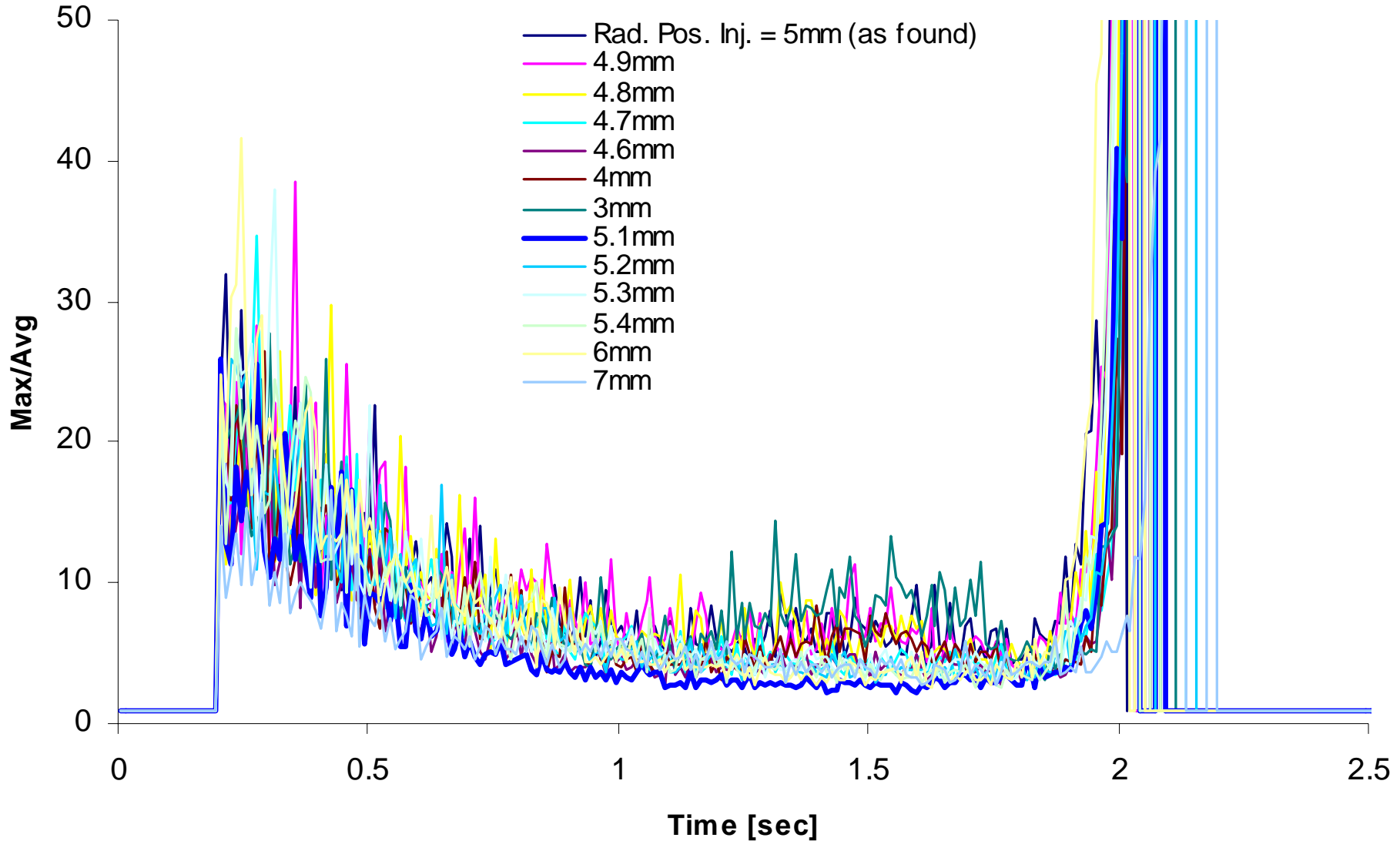




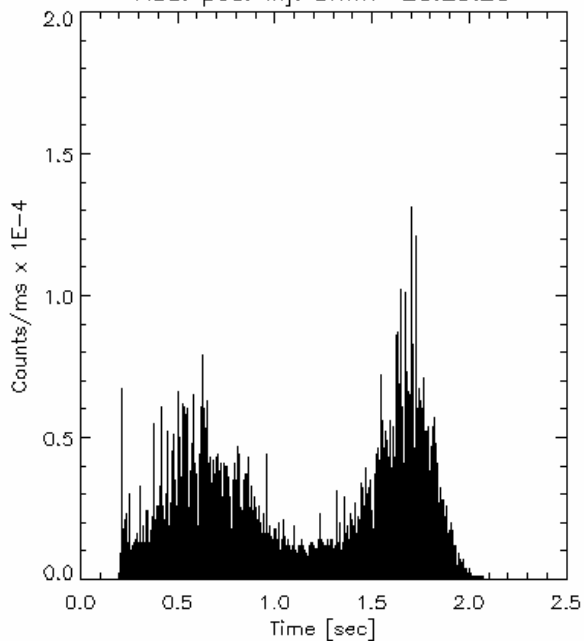


- Offset in injection energy relative to synchronous energy
- No cooling
- Natural chromaticity

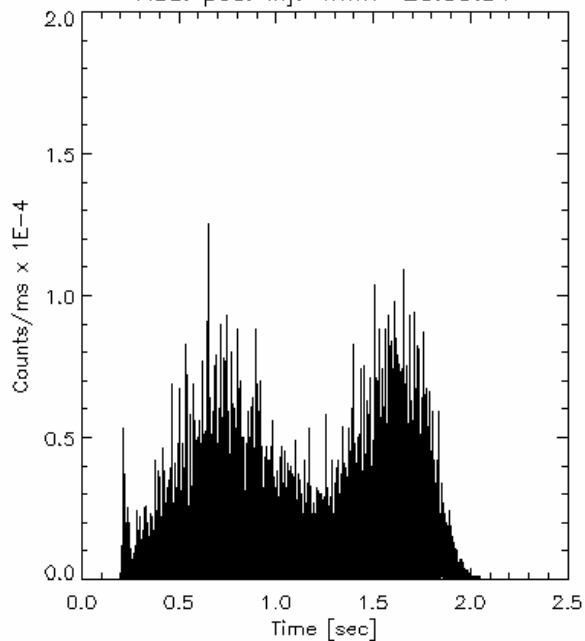
Quality factor in the spills



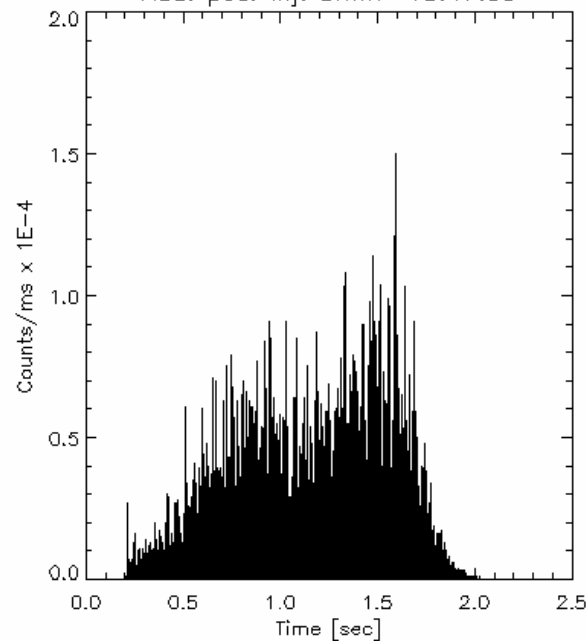
Rad. pos. inj. 3mm 20:23:20



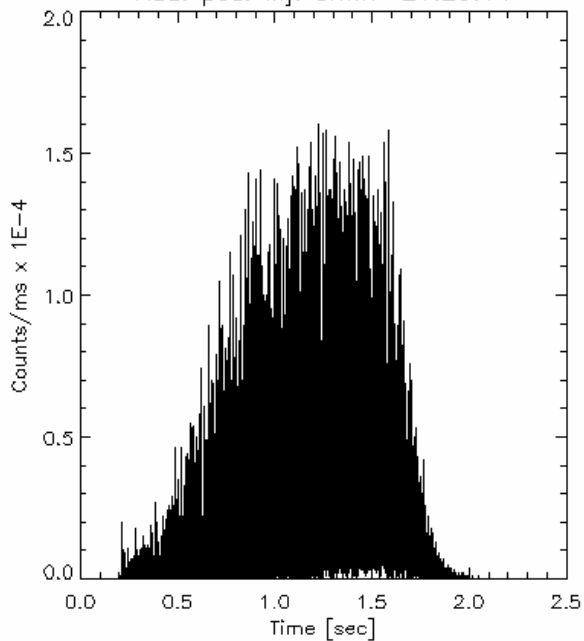
Rad. pos. inj. 4mm 20:09:31



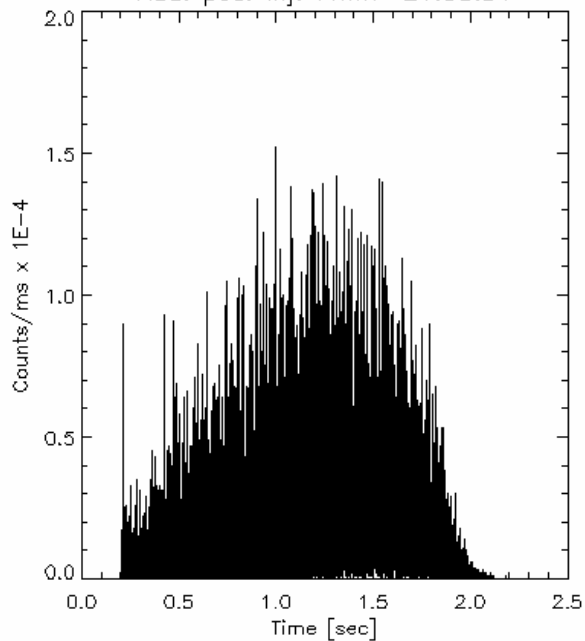
Rad. pos. inj. 5mm 18:47:09

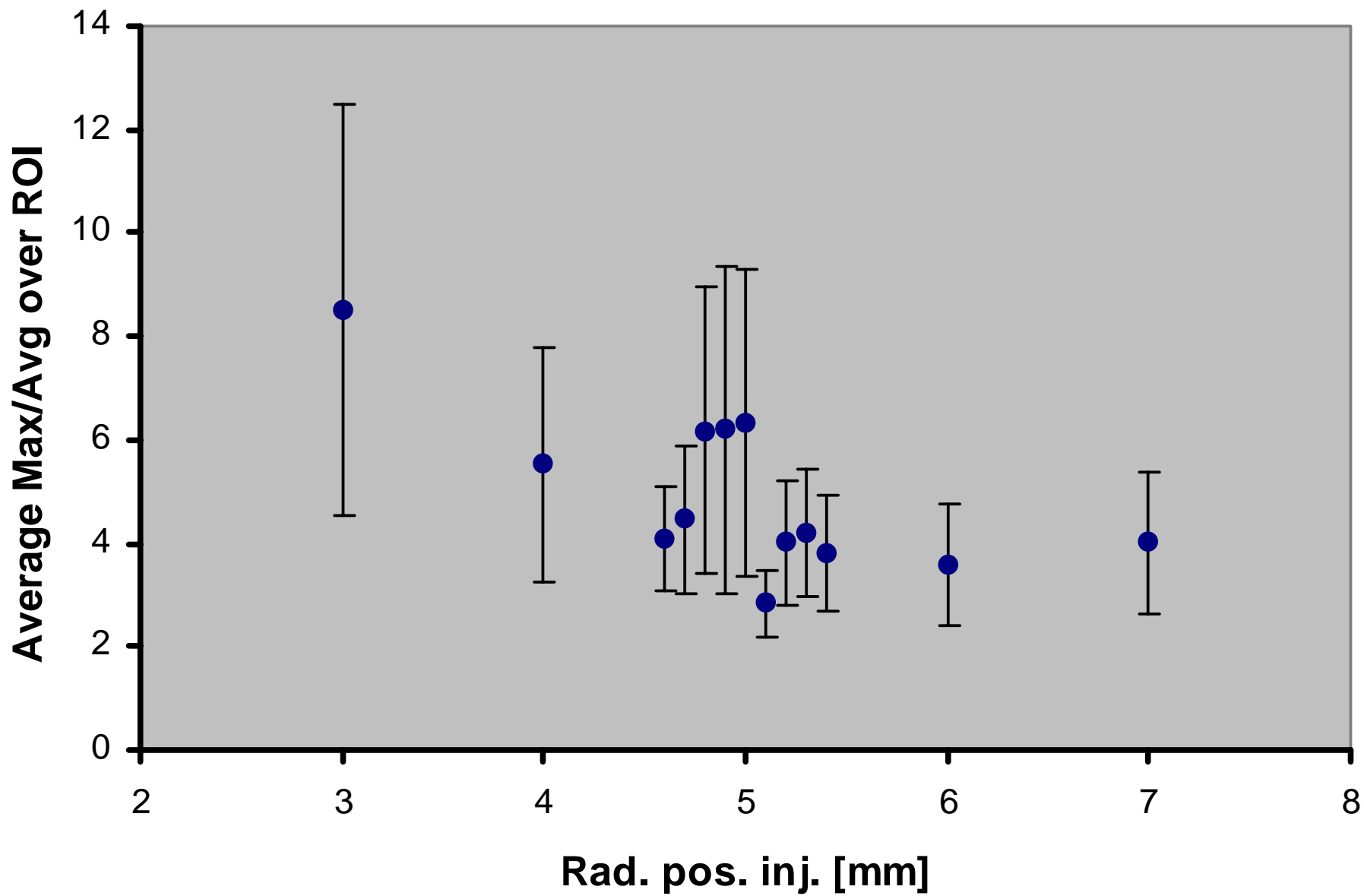


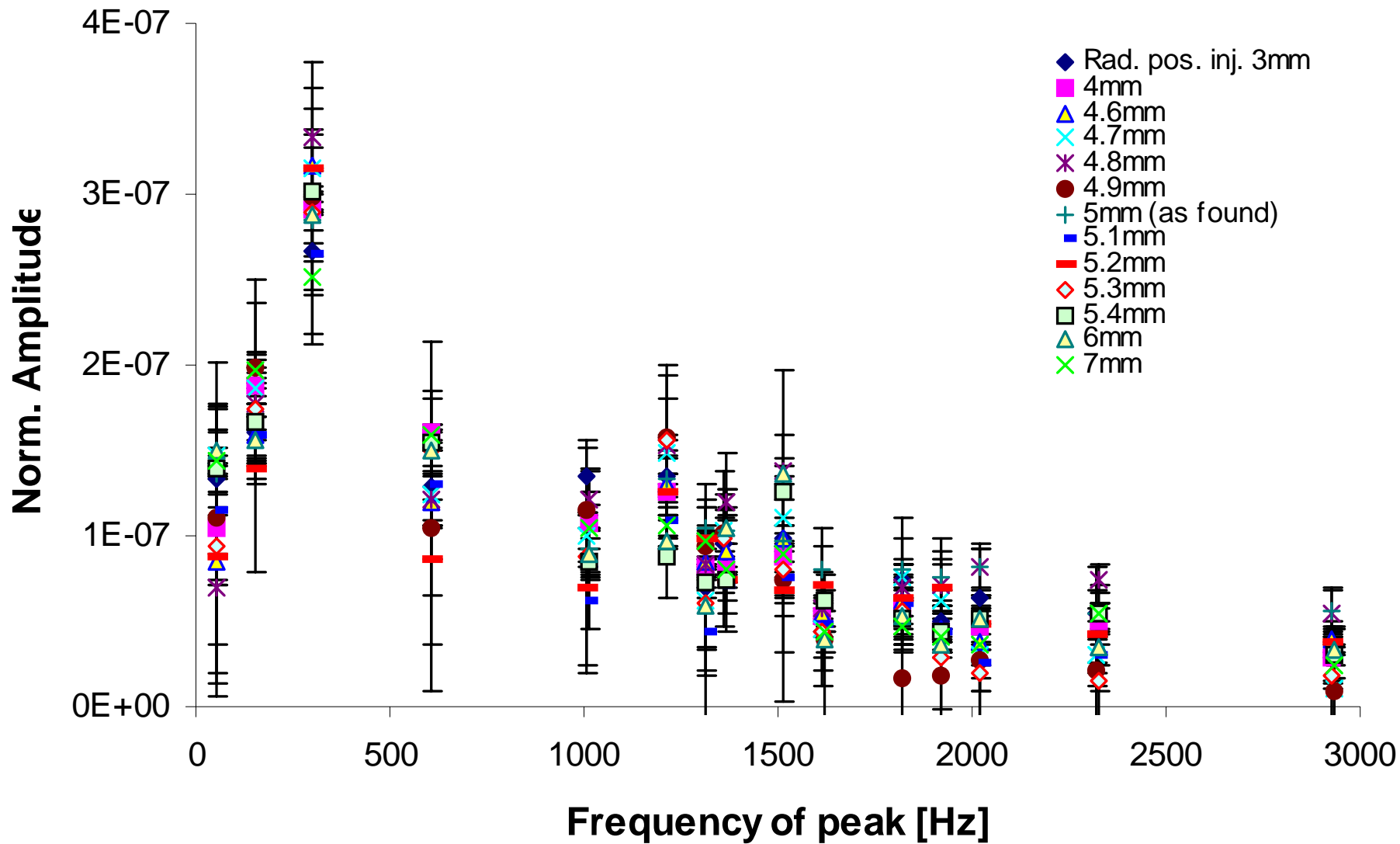
Rad. pos. inj. 6mm 21:26:44



Rad. pos. inj. 7mm 21:38:51

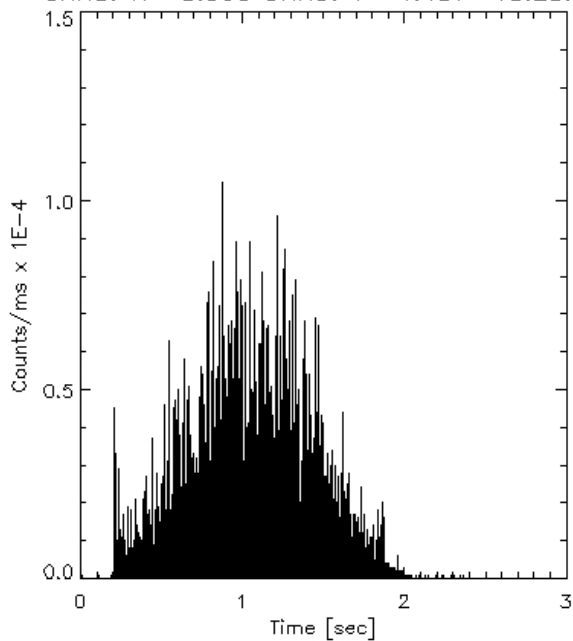




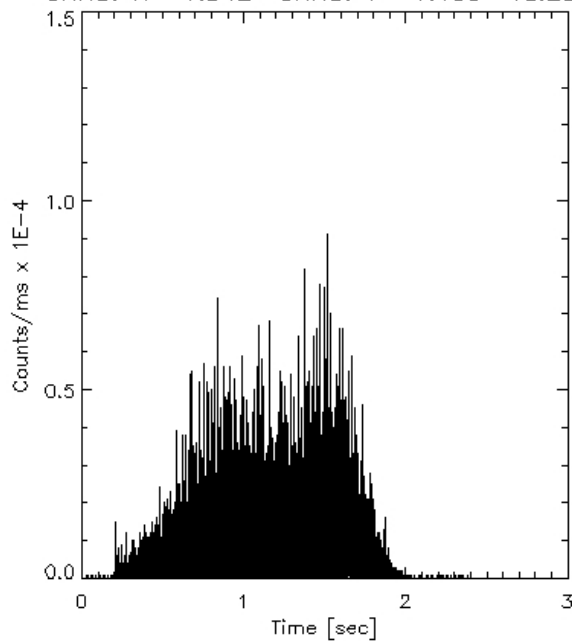


- Corrected chromaticity (extraction)
- No cooling

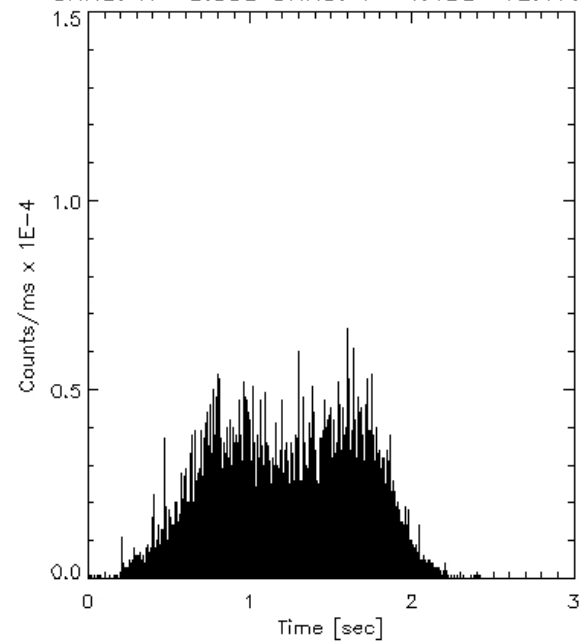
CHRO. H -0.066 CHRO. V -1.437 19:23:38



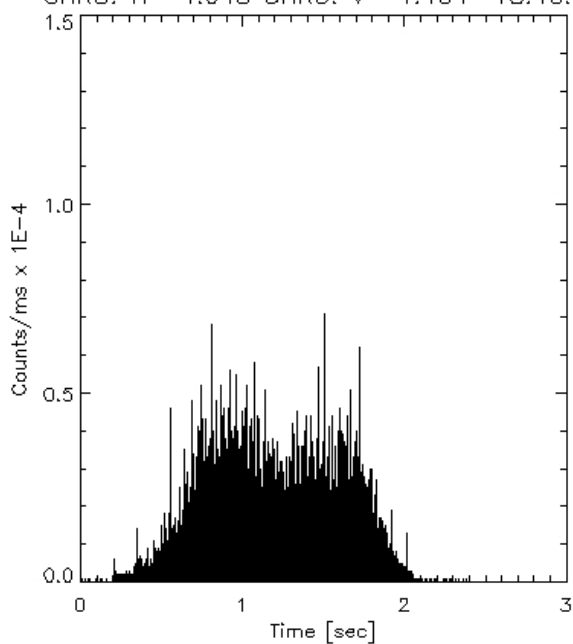
*CHRO. H -1.542 *CHRO. V -1.465 18:28:38



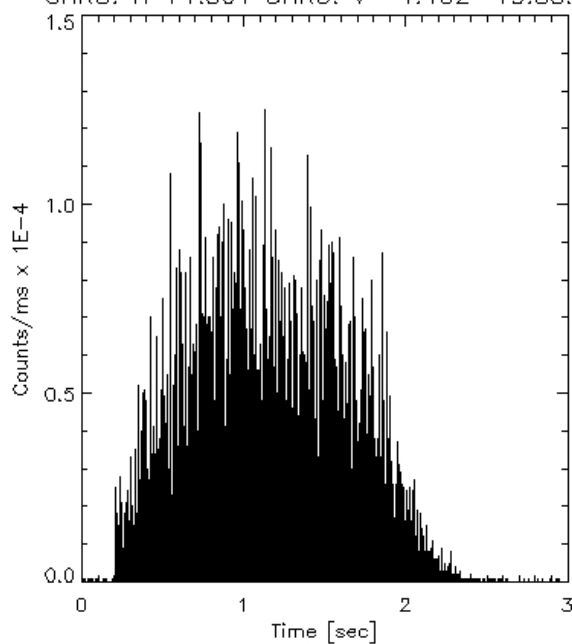
CHRO. H -3.035 CHRO. V -1.438 18:17:39

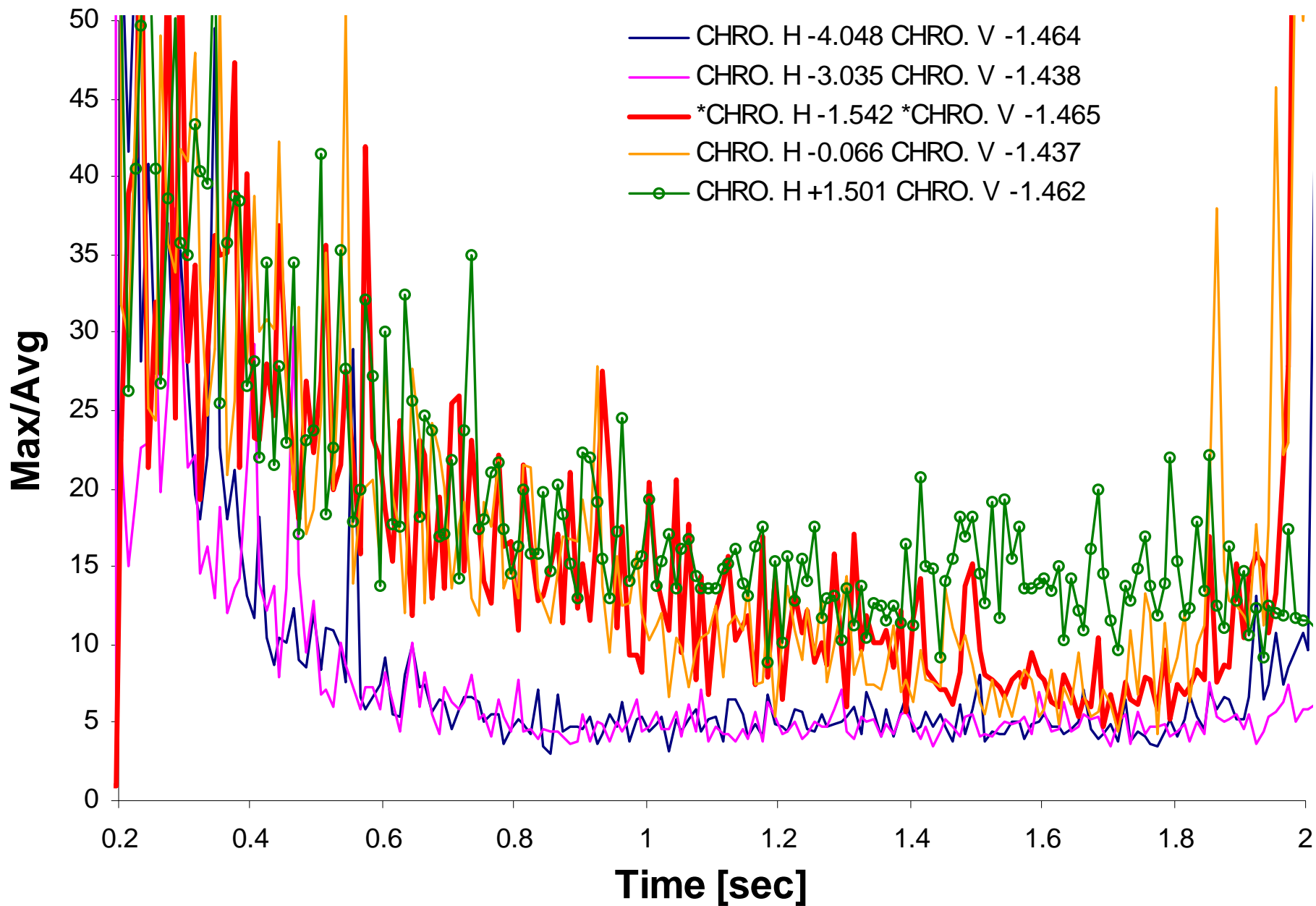


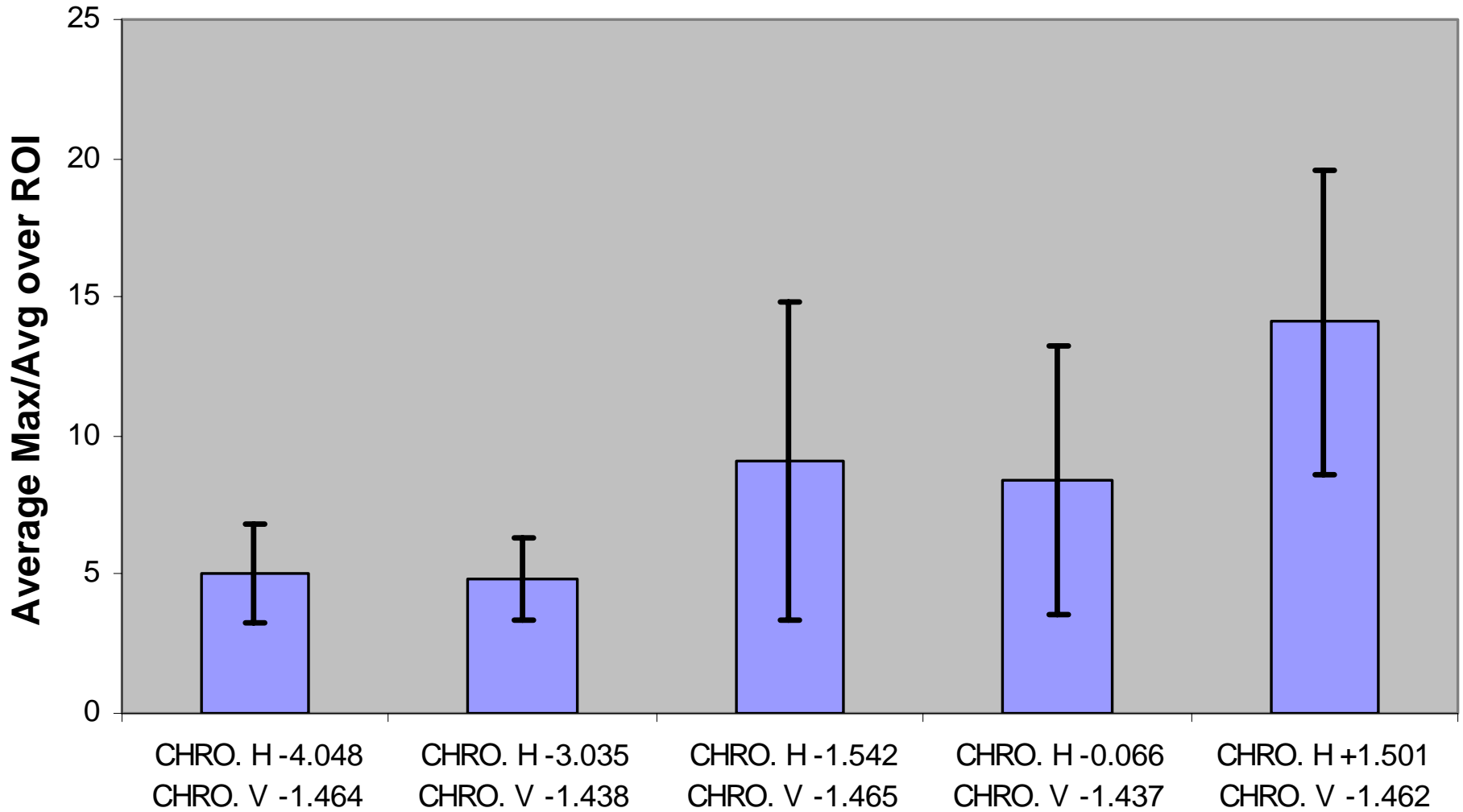
CHRO. H -4.048 CHRO. V -1.464 18:46:52



CHRO. H +1.501 CHRO. V -1.462 19:58:29

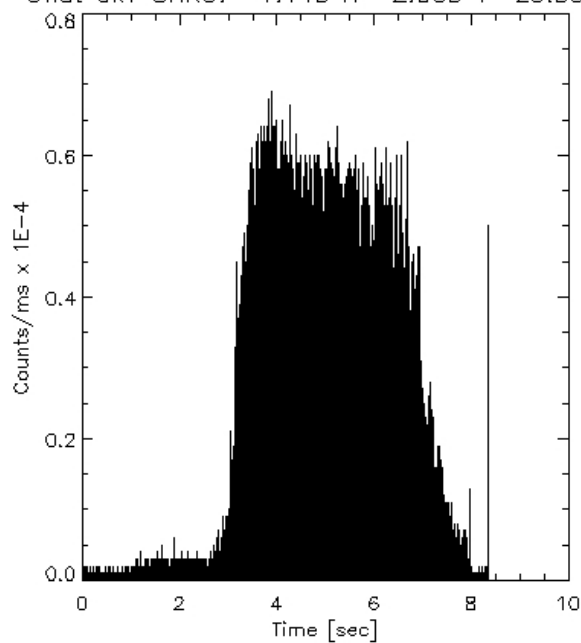




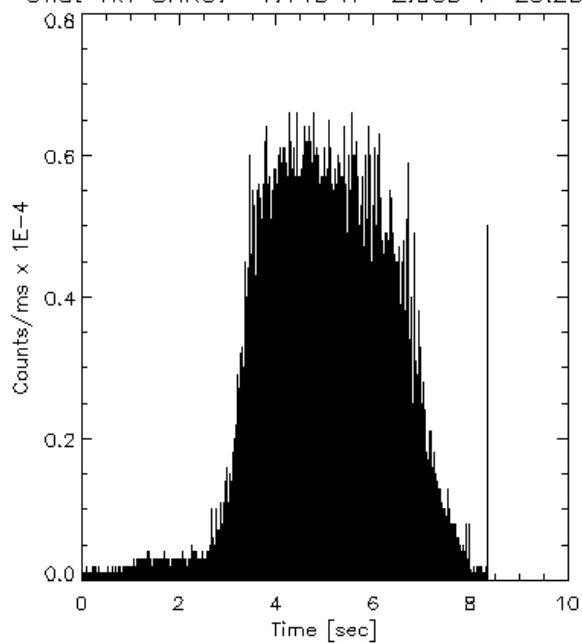


- Corrected chromaticity
- Bunched beam
- No cooling

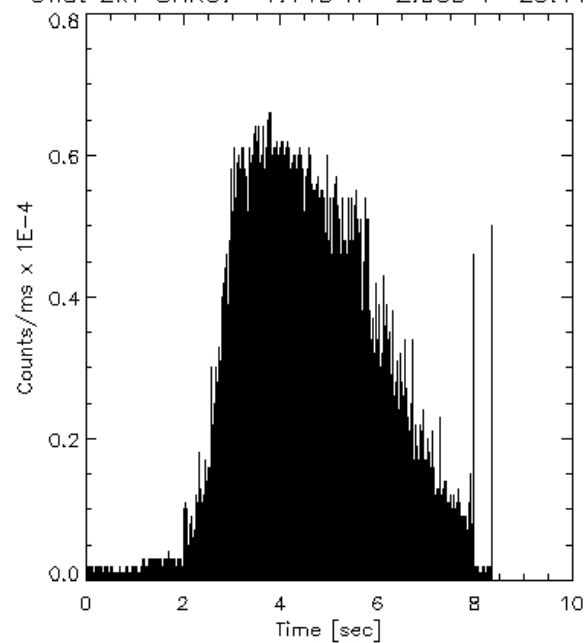
Uflat 0kV CHRO. -1.145 H -2.065 V 23:36:40



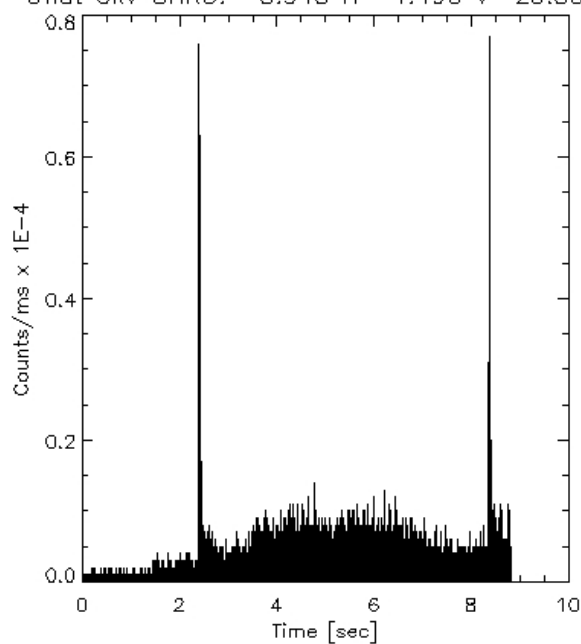
Uflat 1kV CHRO. -1.145 H -2.065 V 23:25:21



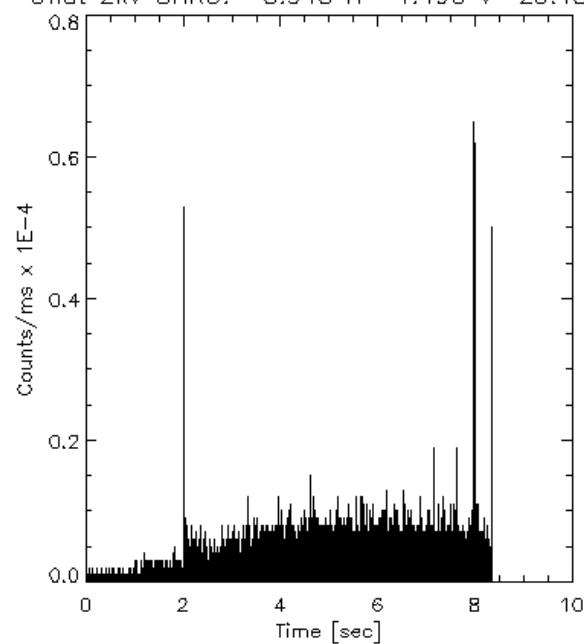
Uflat 2kV CHRO. -1.145 H -2.065 V 23:41:40

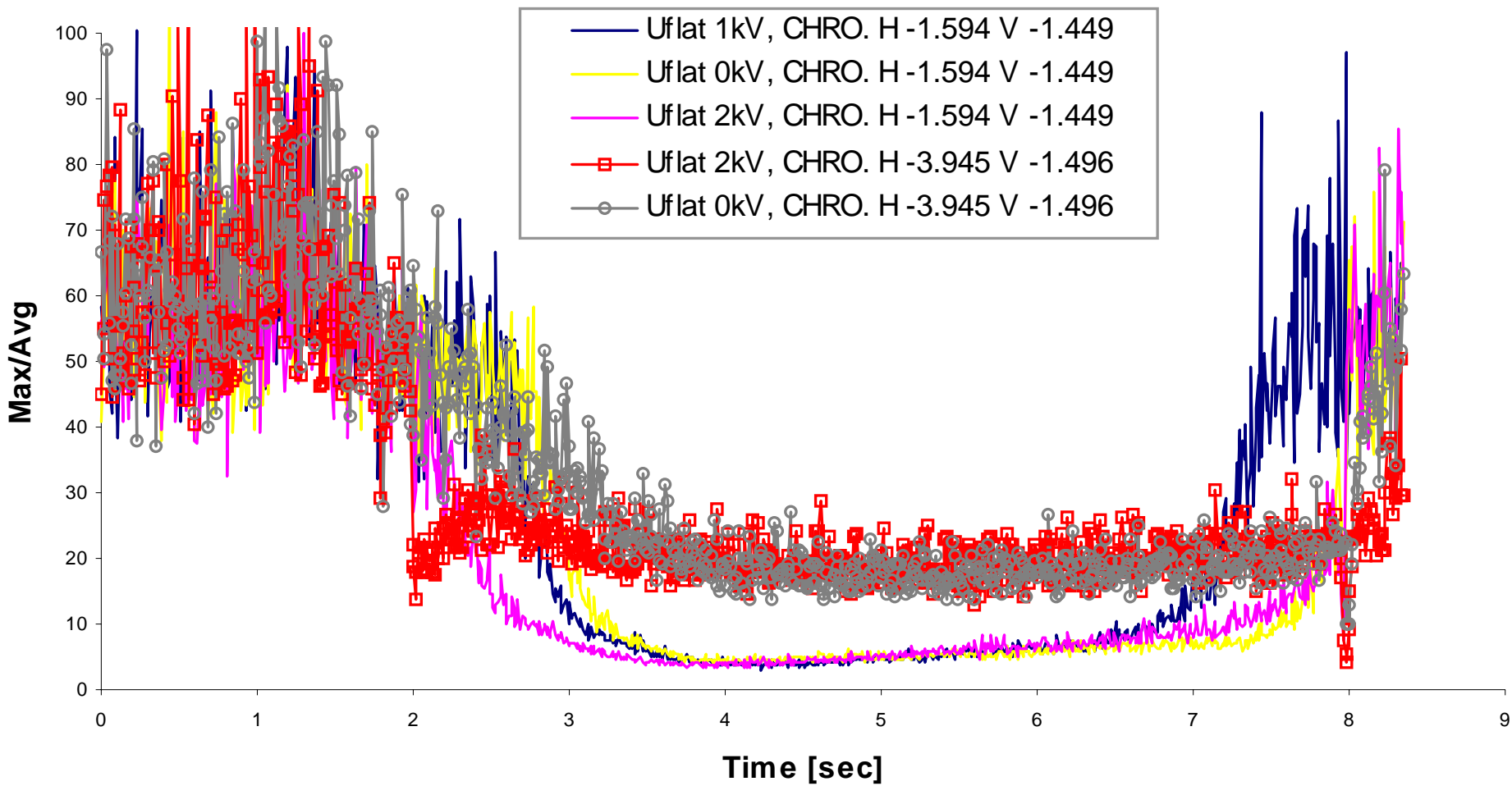


Uflat 0kV CHRO. -3.945 H -1.496 V 23:56:17

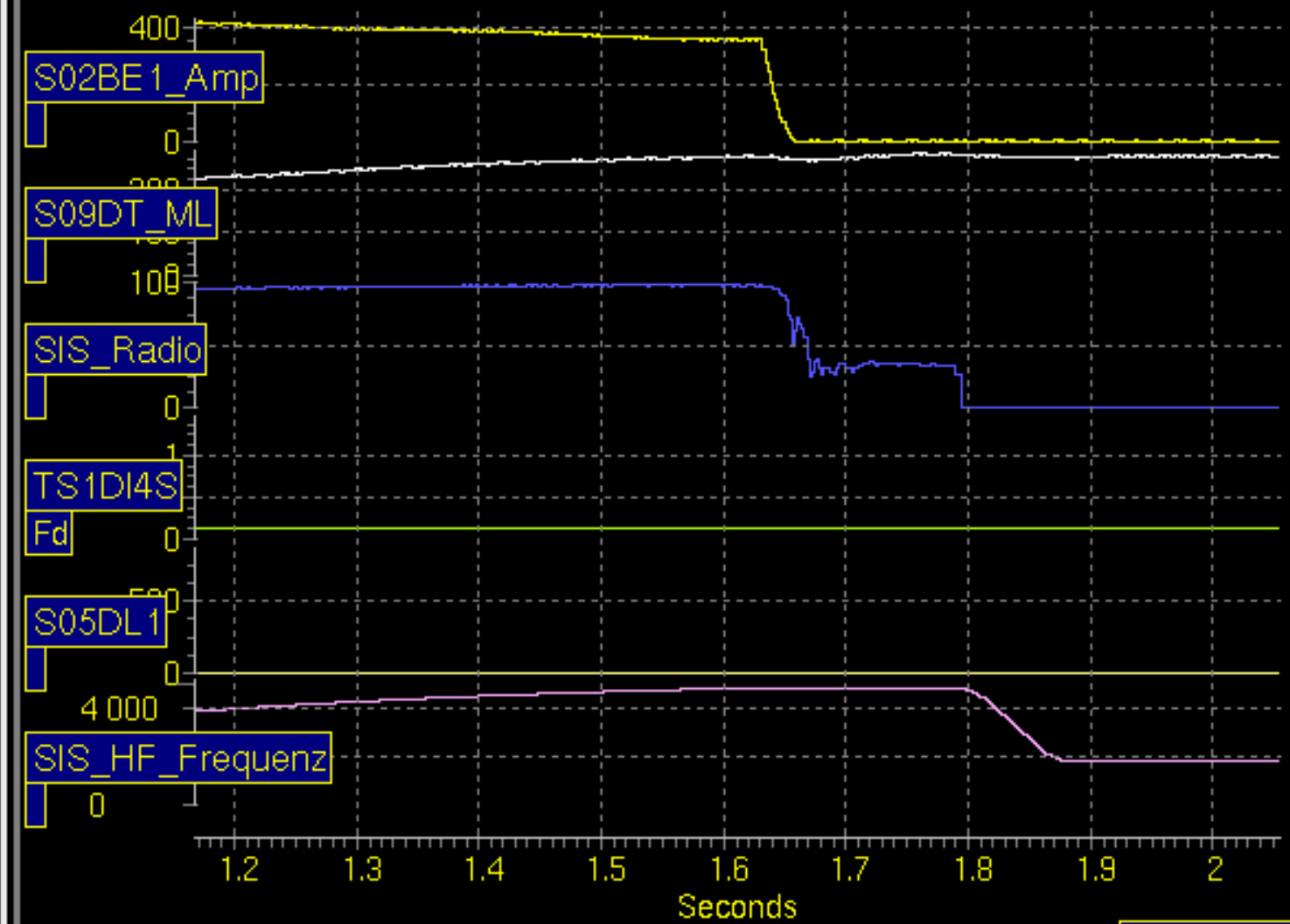


Uflat 2kV CHRO. -3.945 H -1.496 V 23:48:00



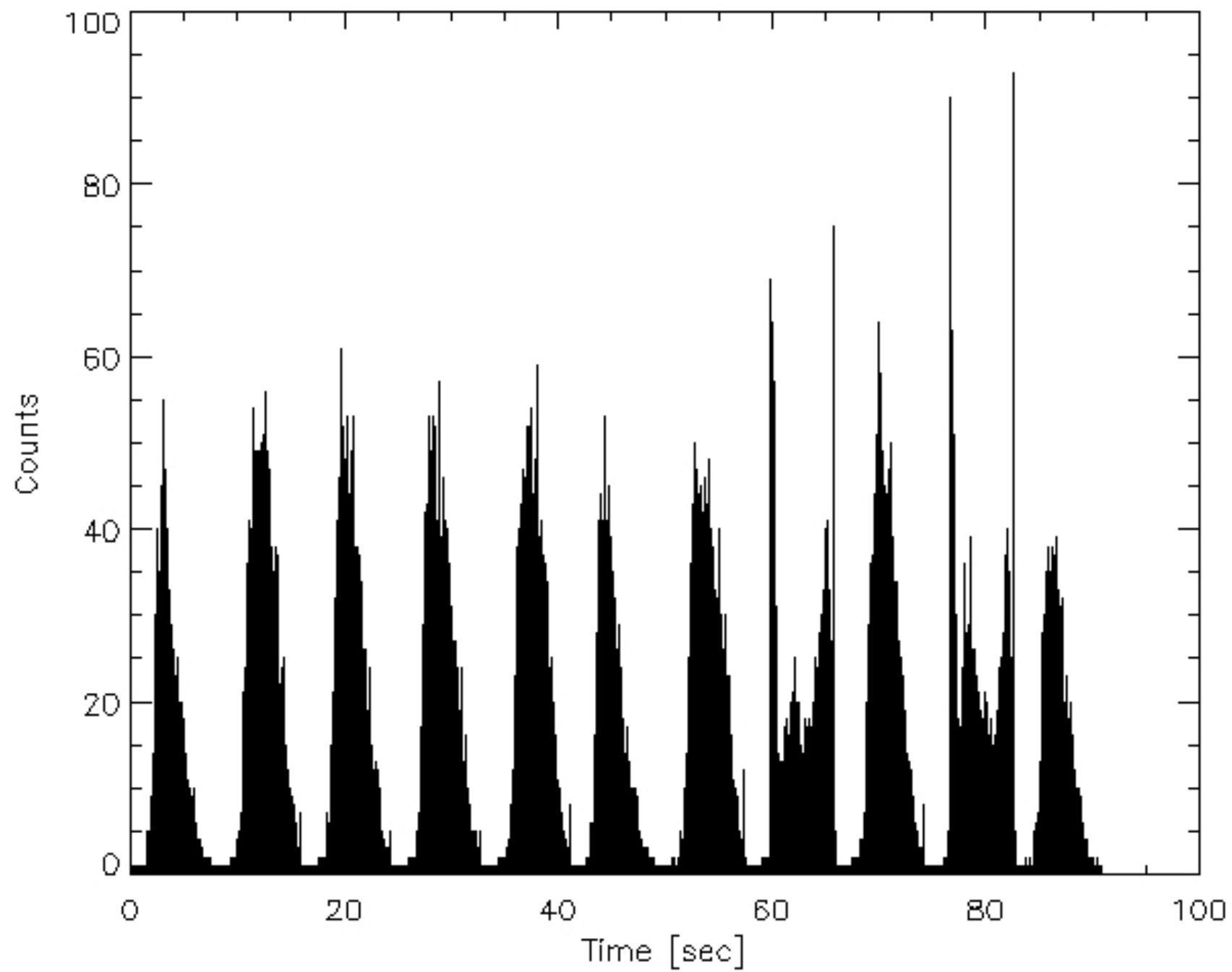


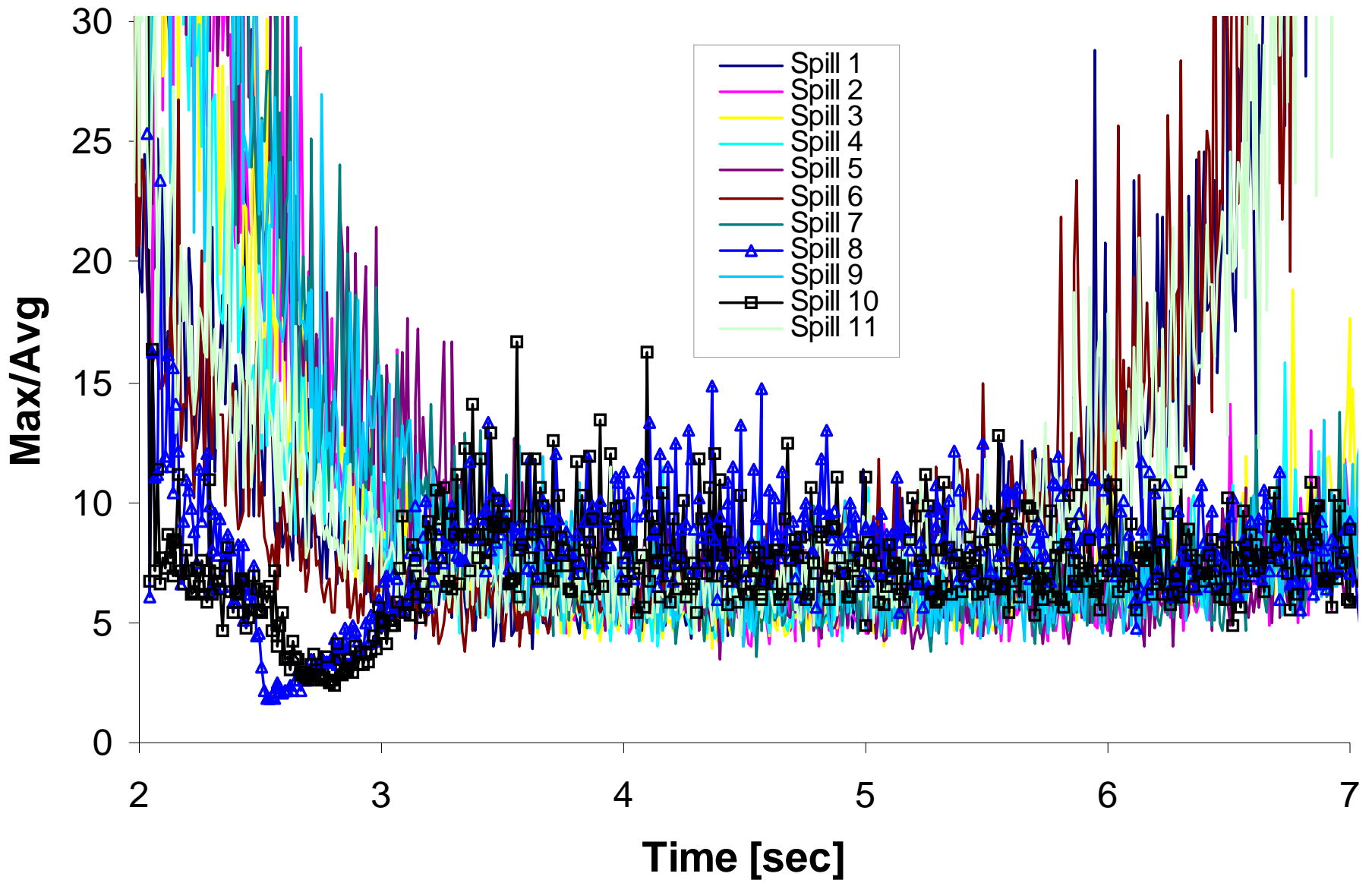
- High intensity

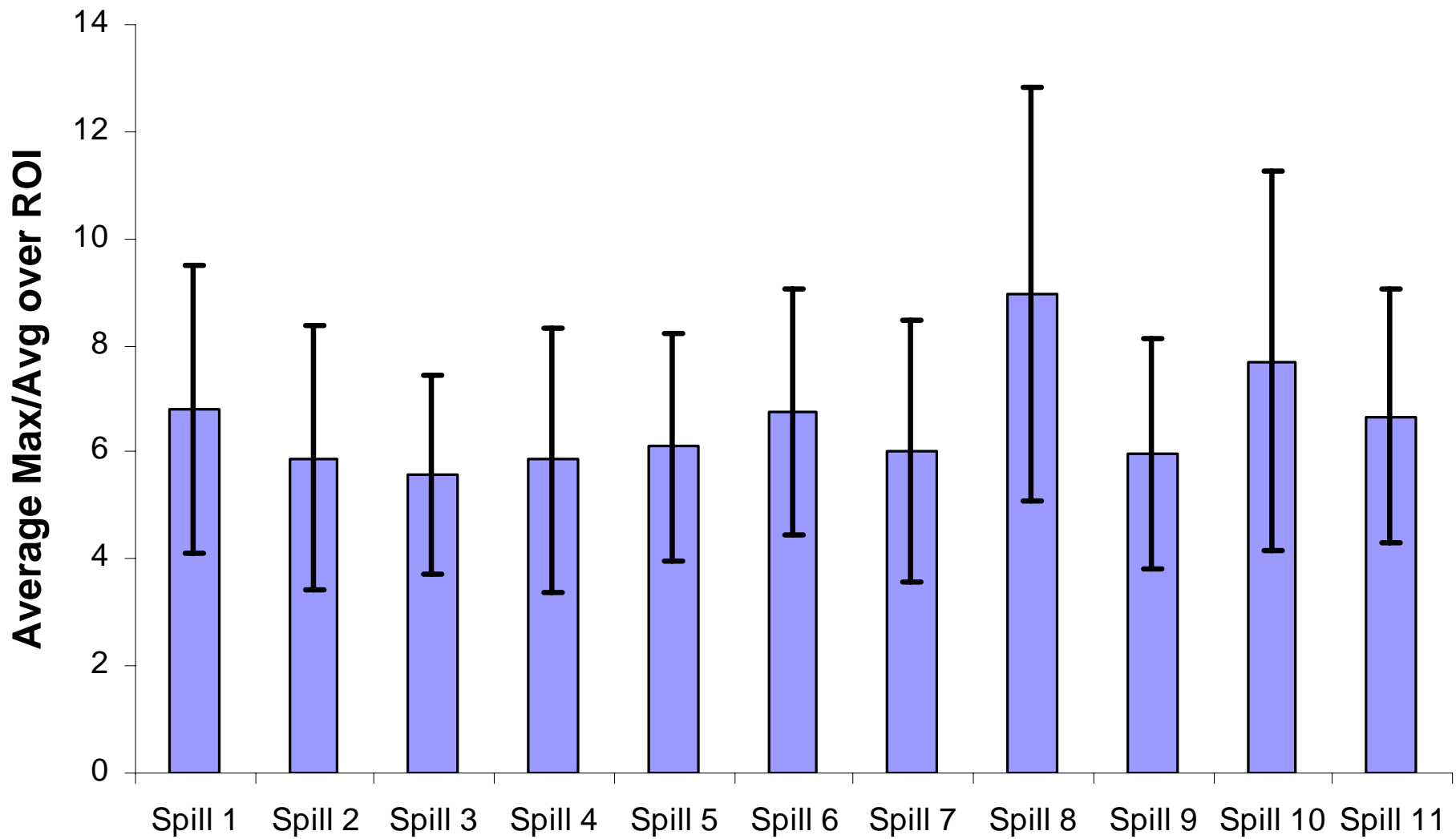


200405 11:33:24

Vrt. Acc #08



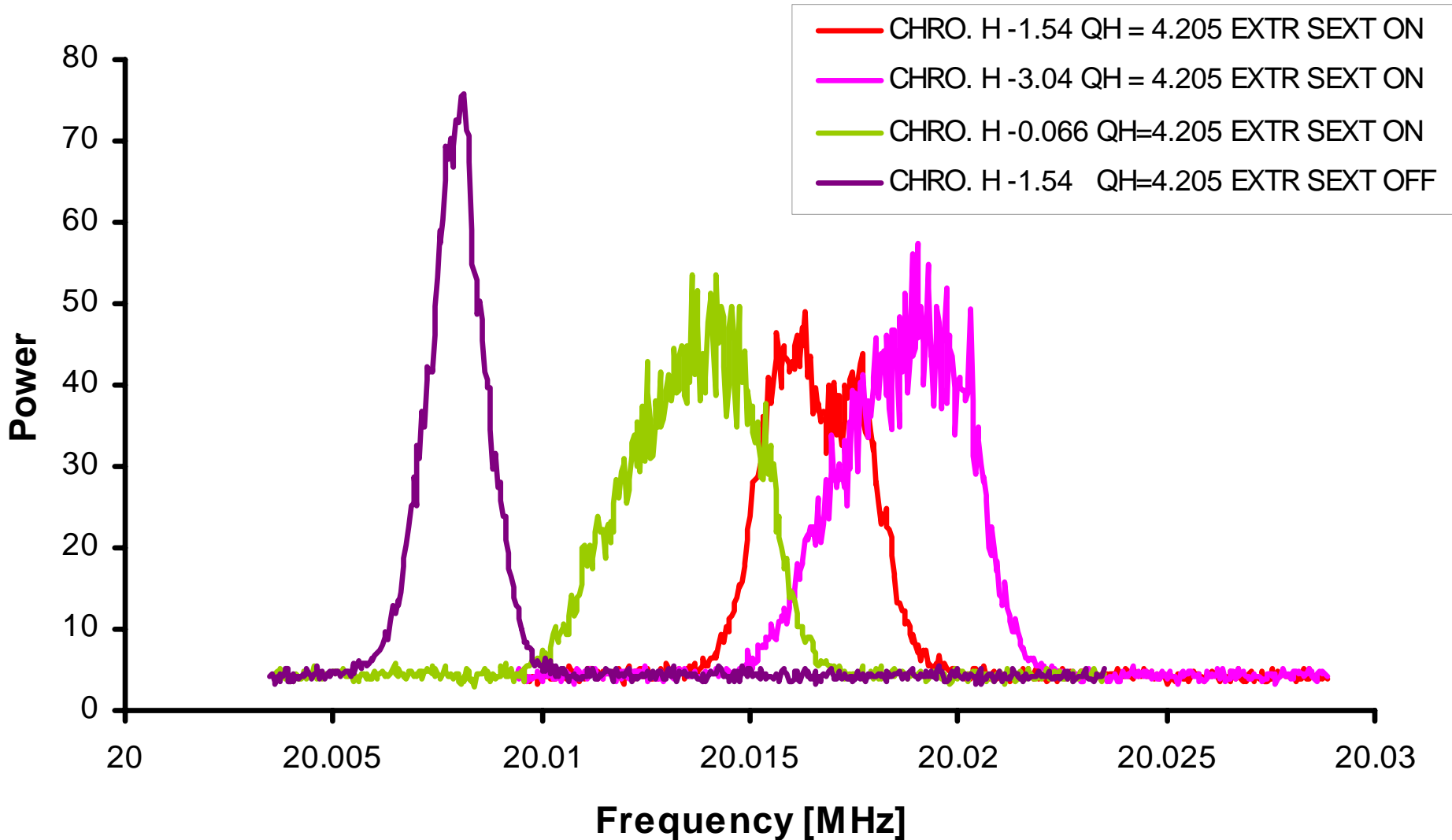




- Tune and chromaticity evaluation from betatron sidebands

Amplitude dependent focussing significant...

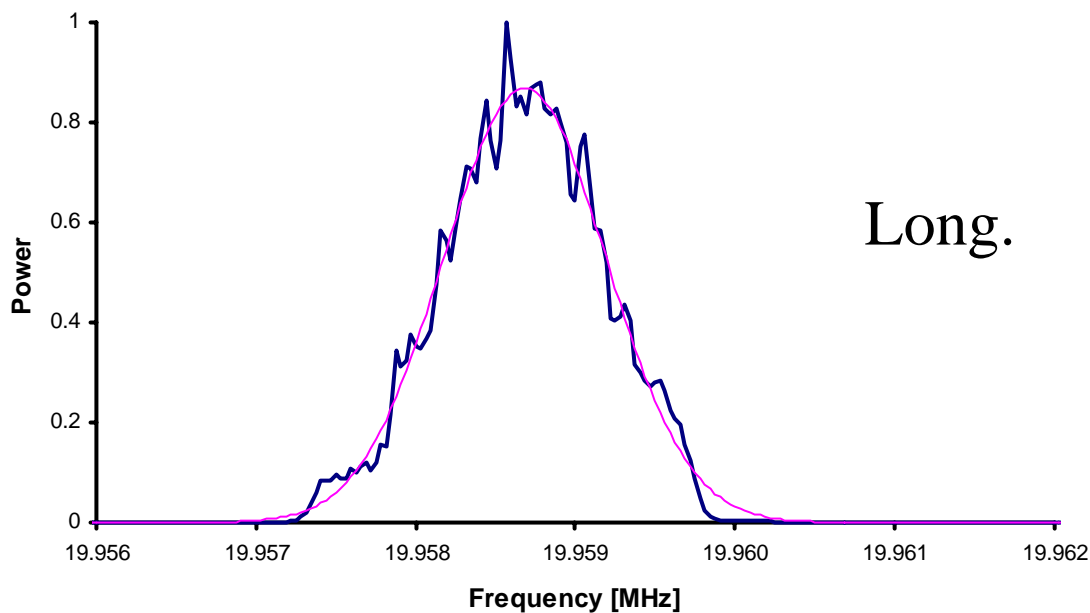
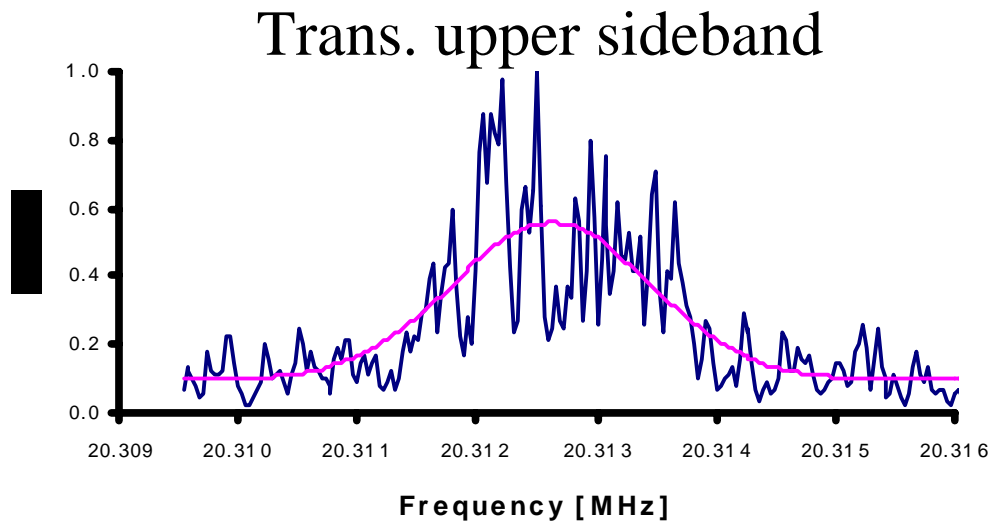
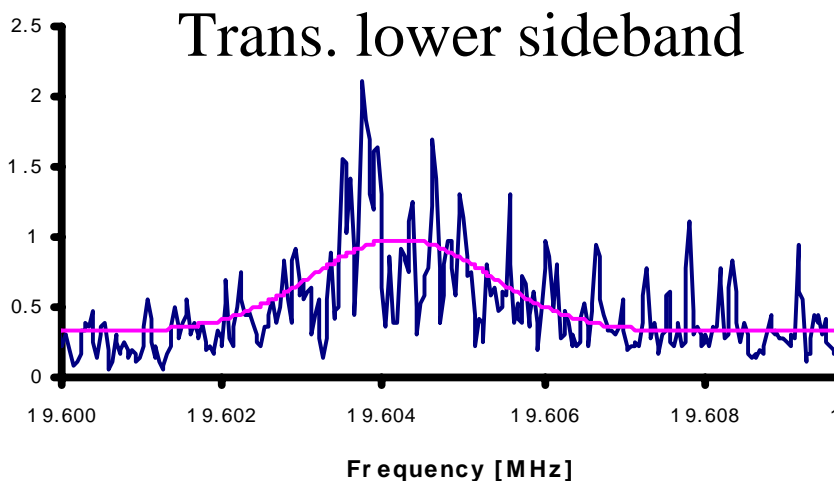
Qh ist when no sextupoles are present = 4.22, Soll = 4.2(?)



Qh ist = 4.34 Soll = 4.32

Chrom.(H) ist = -2.75...-3.67 Soll = -4.56

$$\xi = \Delta f_{\pm} / Q_0 f_0 \delta$$



Conclusions

- Misaligning the cooler e- energy provided exceptionally smooth microstructure
- The effect of chromaticity was not as strong as anticipated by the theory
- It's important to compare Max/Avg over regions of interest with the same average counts per bin and similar form in the 'macro' envelope
- Macro envelope in high intensity spills fluctuate heavily. Microstructure fluctuates also by a few % (Max/Avg)
- To date, the only reliable chromaticity calculations are based on Mirko (theory)

Outlook

- Spill measurements with careful attention to ist tunes and beam losses must be undertaken
- Chromaticity is perhaps best checked using a bunched beam (synchrobetatron sidebands)
- Other things to try: RF KO, RF noise to heat beam in bucket