



Edge ECE measurements with the AUG CTS receiver and the effects of ELMs during H-mode

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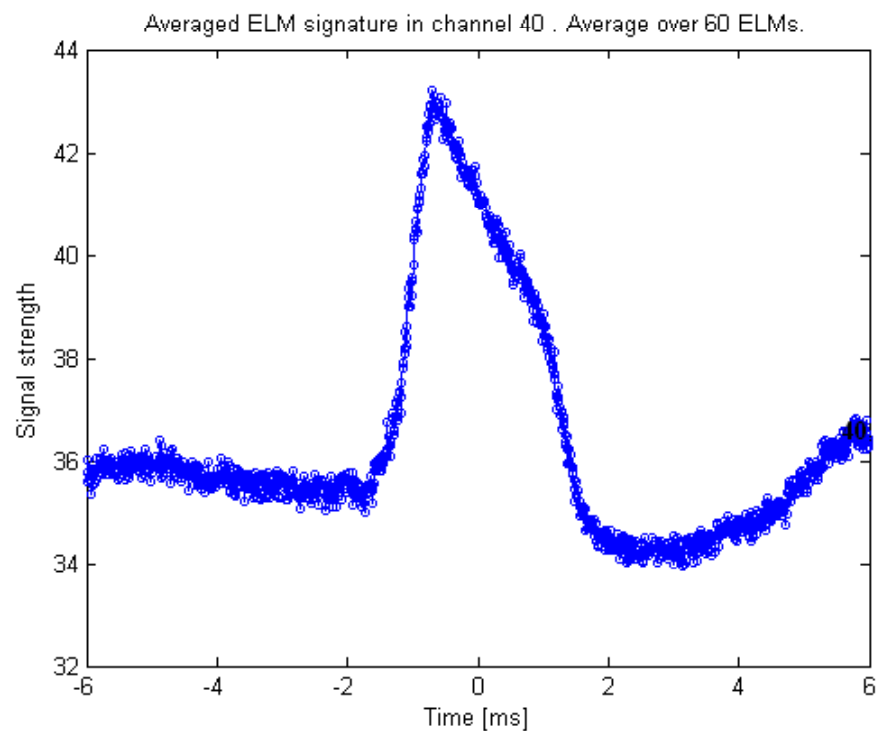
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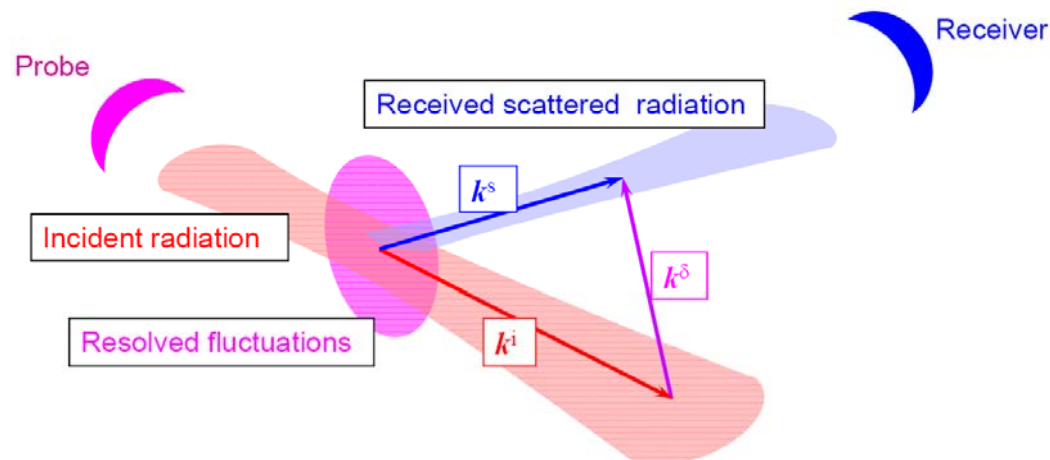
Edge ECE measurements with the AUG CTS receiver and the effects of ELMs during H-mode

Morten Stejner



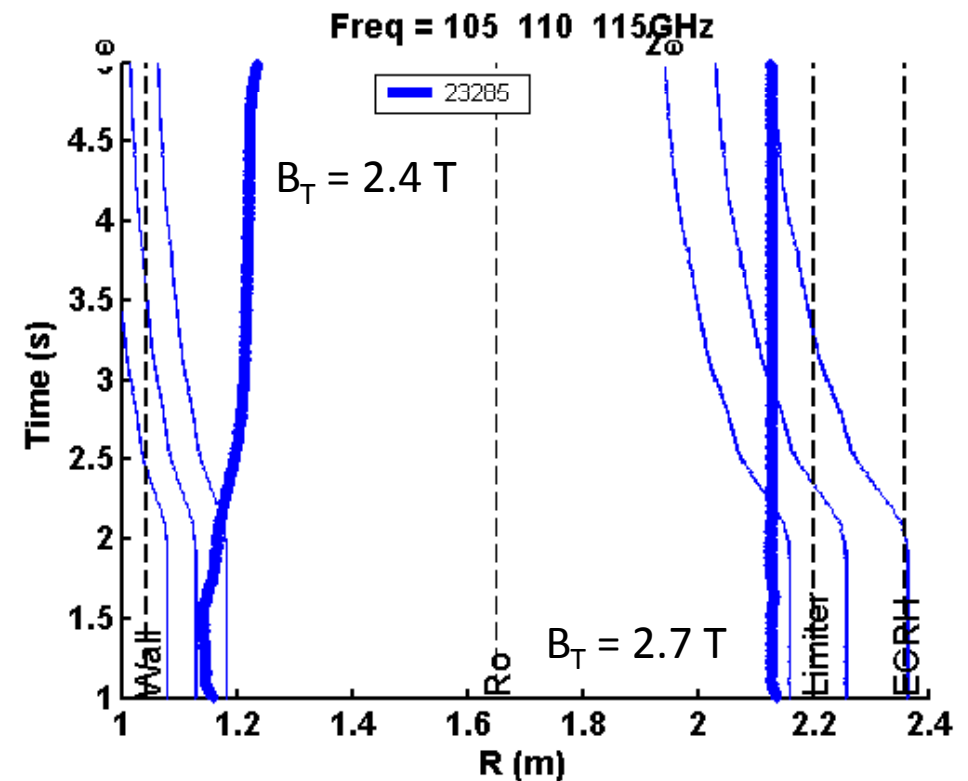
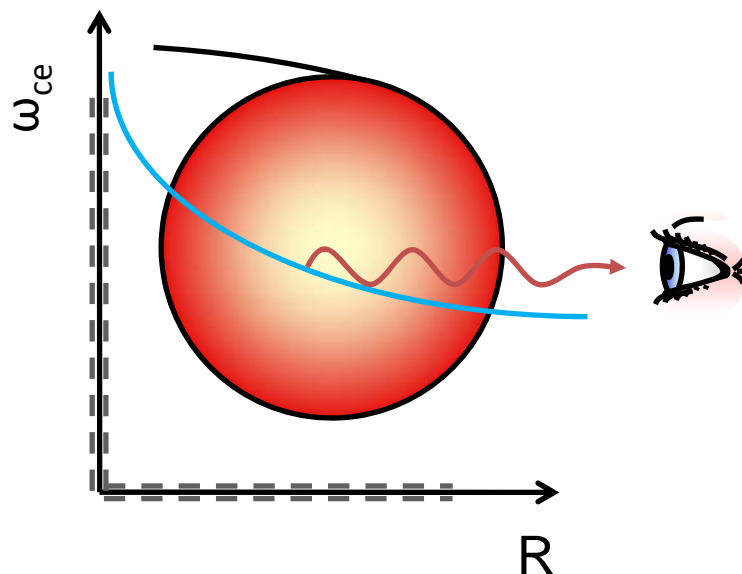
The Collective Thomson Scattering diagnostic

- Measures the scattering of powerful microwave probe radiation from microscopic collective plasma fluctuations
- Seeks to infer information about the plasma from the scattered spectrum: Temperature, fast ion velocity distribution, **plasma composition, rotation ...**
- The AUG CTS receiver is a heterodyne radiometer with
 - Sampling frequency 100 kHz
 - 50 channels covering the range from 105 GHz to 115 GHz
 - 24 bit resolution (temperature resolution of 0.1 eV)

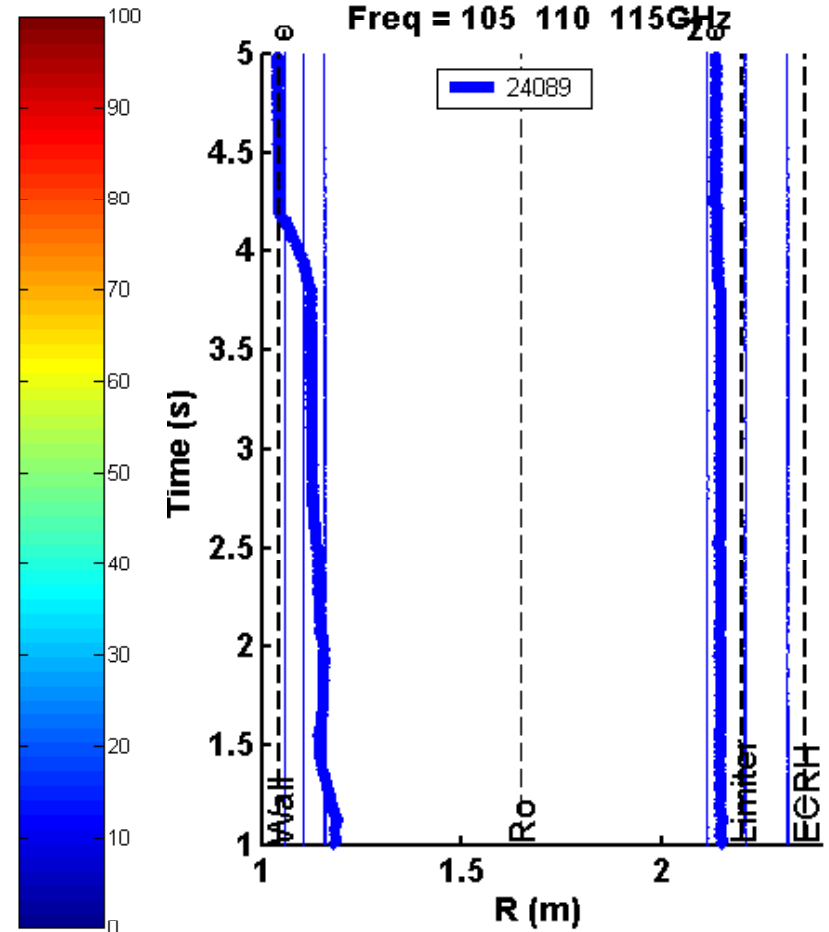
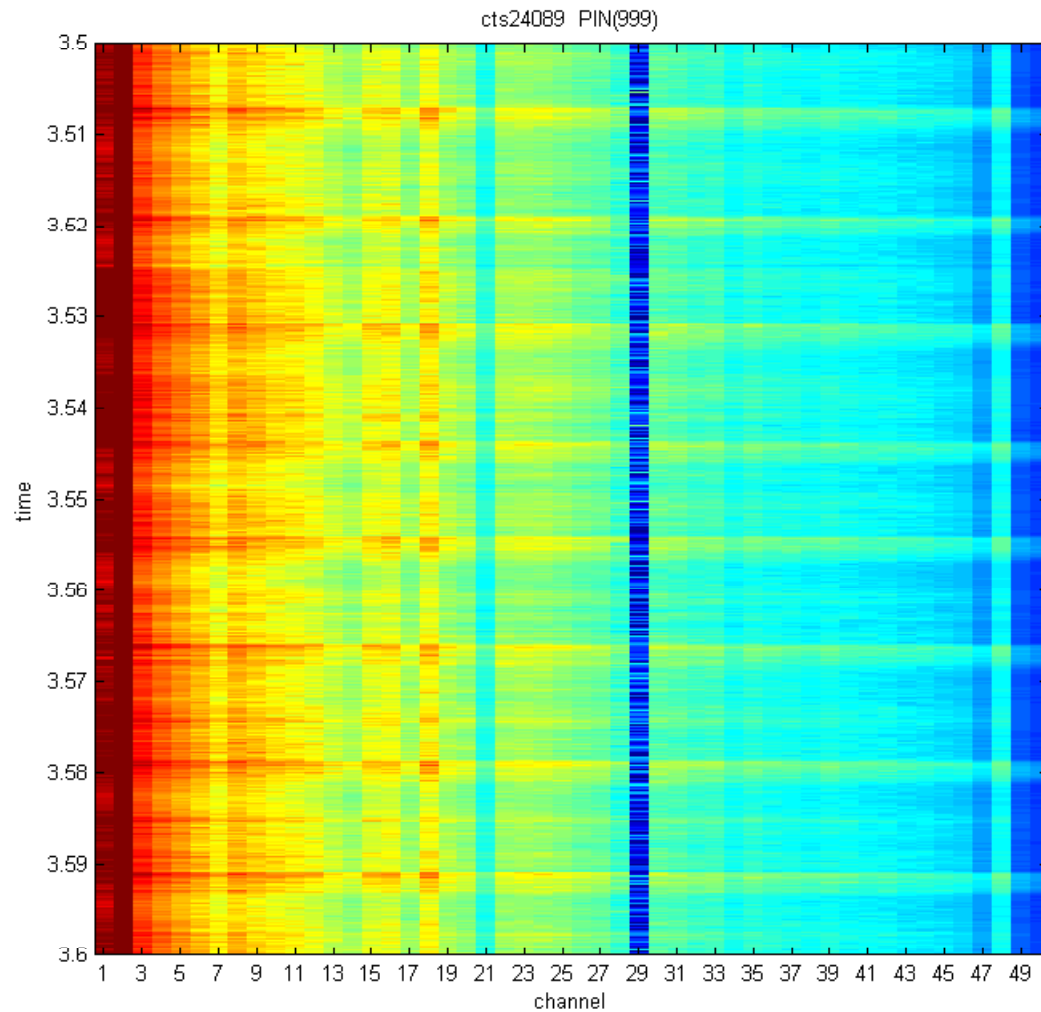


ECE background in the CTS receiver

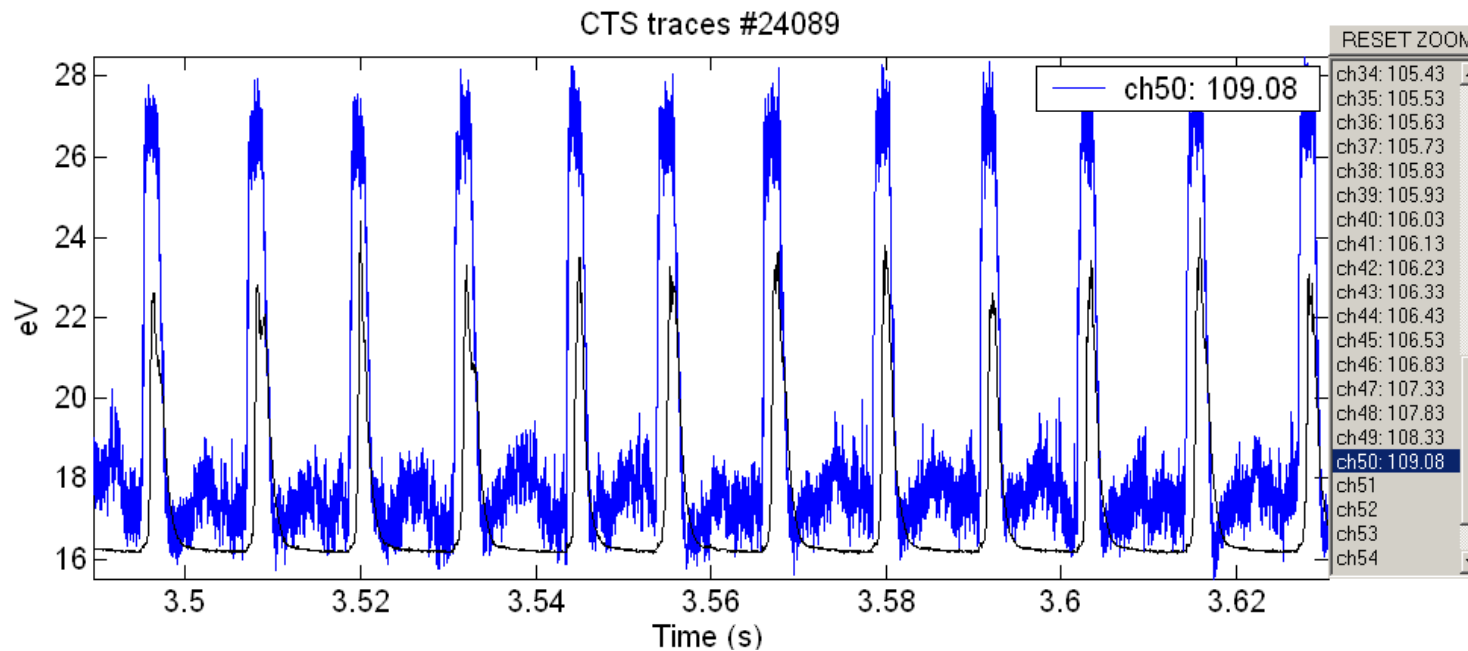
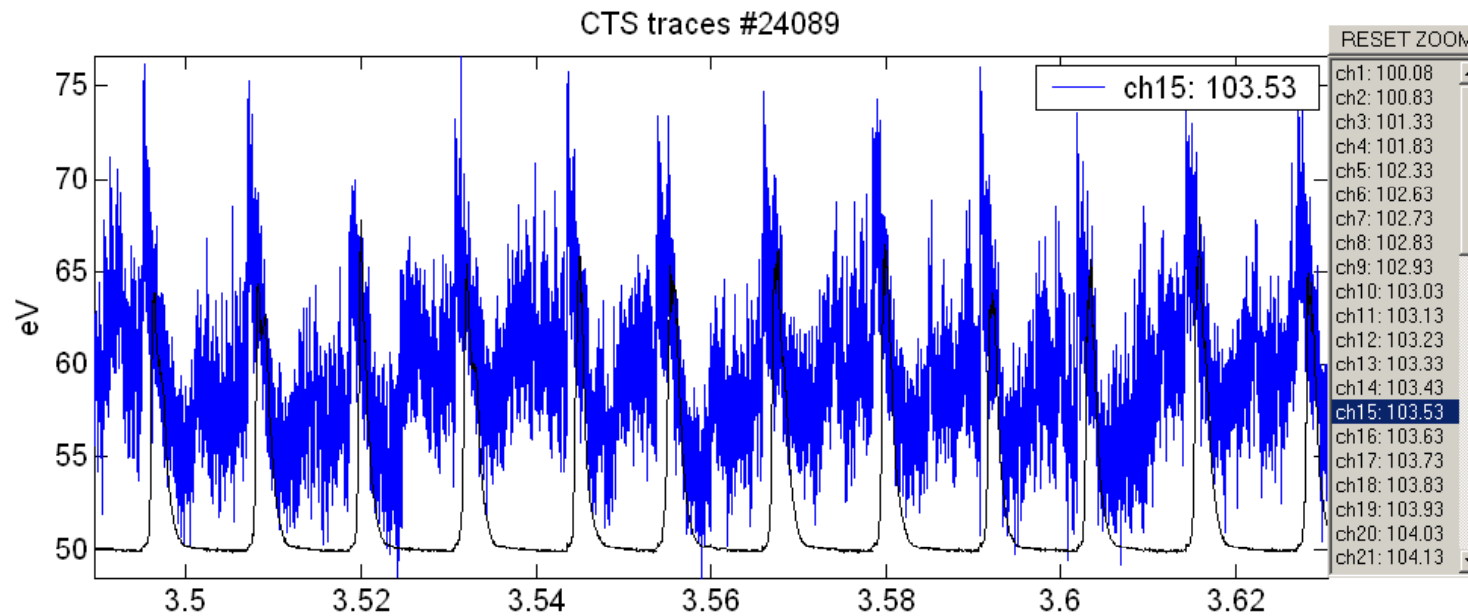
- The 105 – 115 GHz range corresponds roughly to the electron cyclotron fundamental frequency on the high field side plasma edge and the 2. harmonic on the low field side
- **If** the resonances are optically thick the measured signal is directly proportional to the electron temperature



Examples of ECE emission



Time traces of individual channels



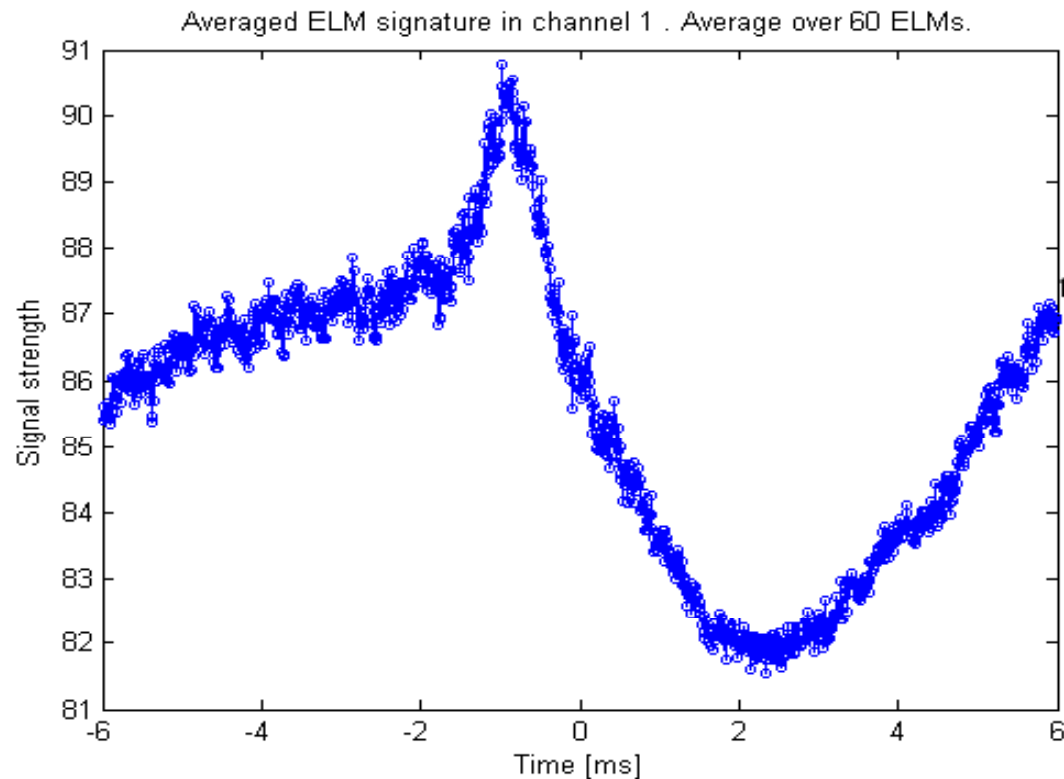
Conditionally averaged ELM profiles

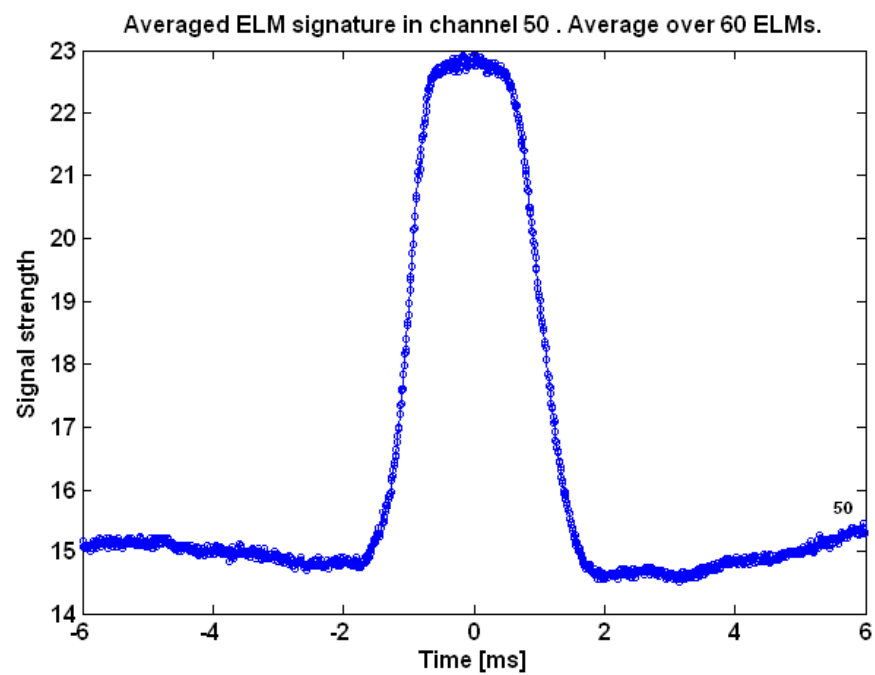
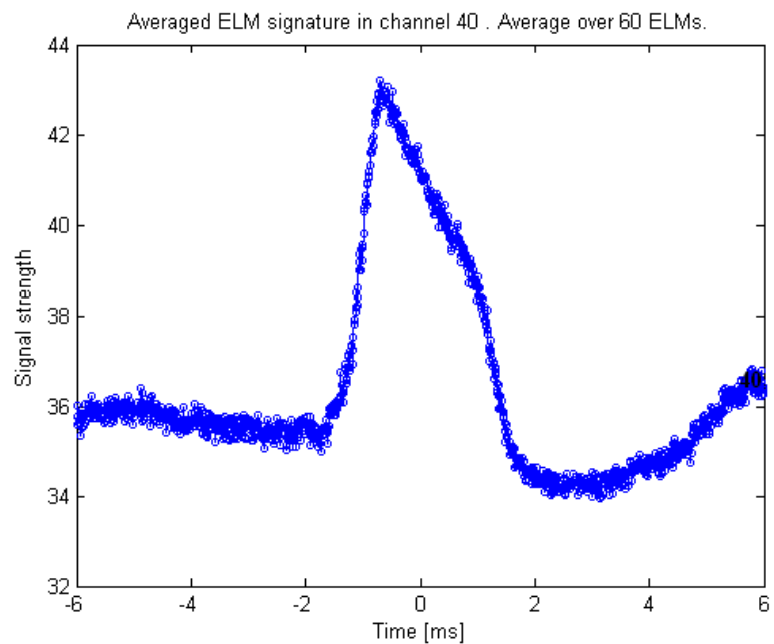
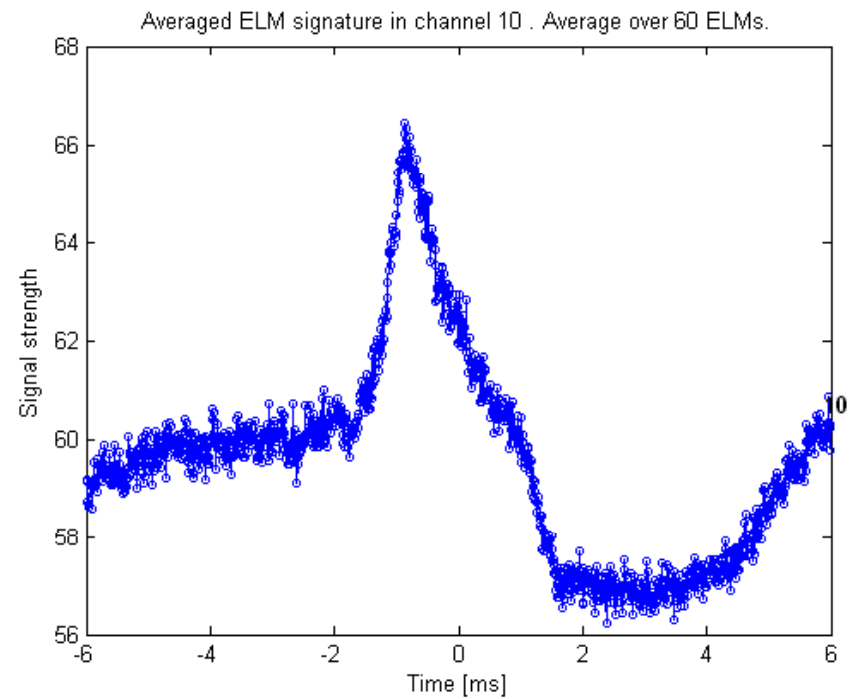
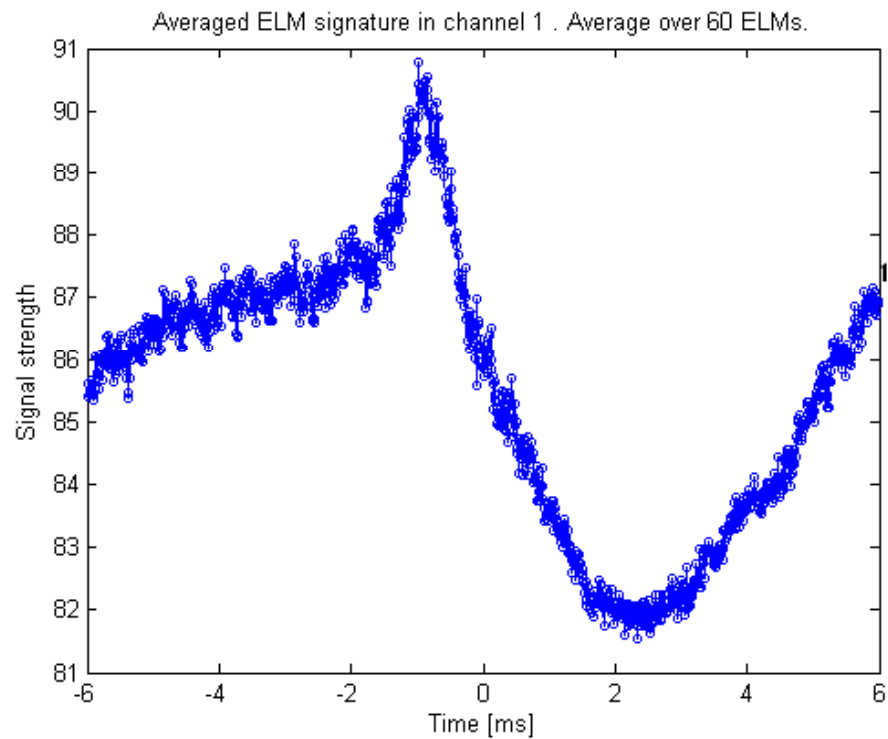
- Step 1)
 - Find all the ELMs from an independent signal (here dst)



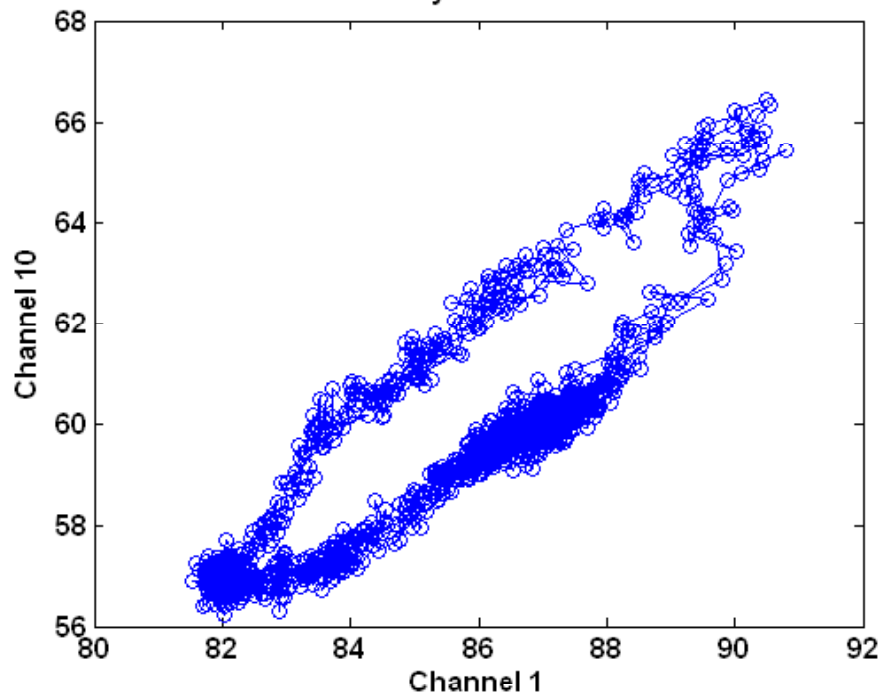
Conditionally averaged ELM profiles

- Step 2)
 - Find the average signal in some time range around each ELM

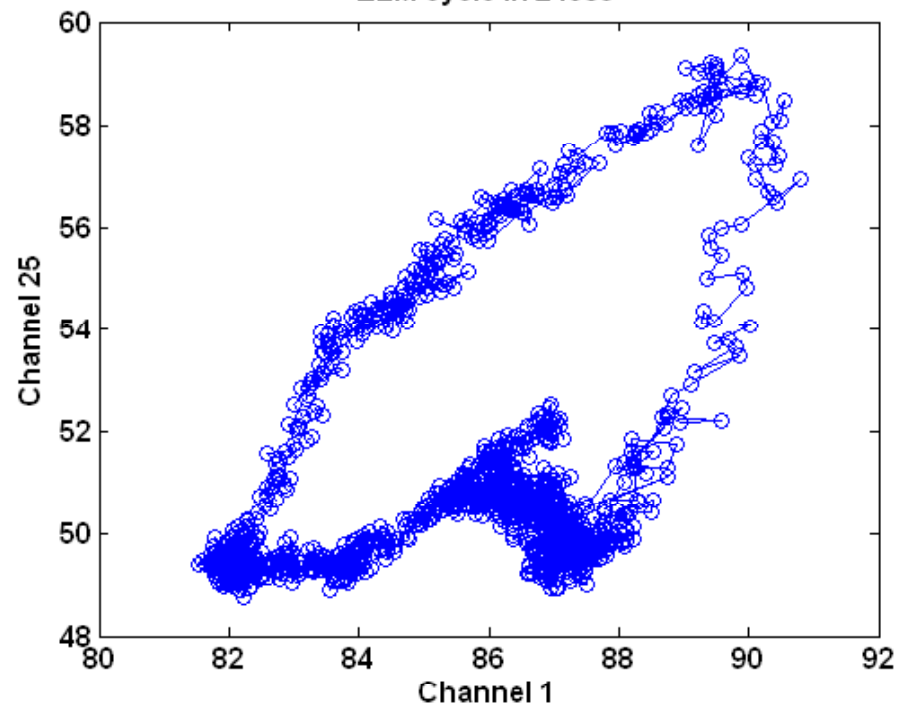




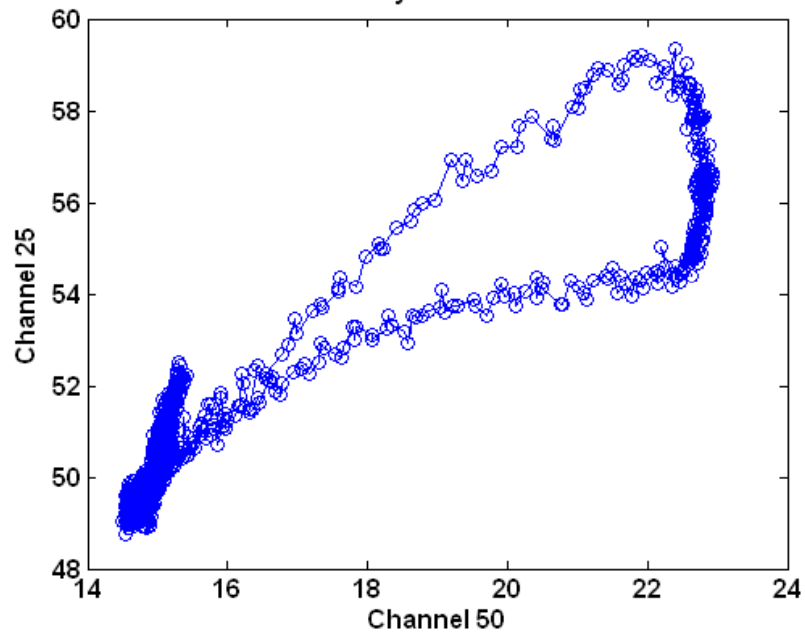
ELM cycle in 24089



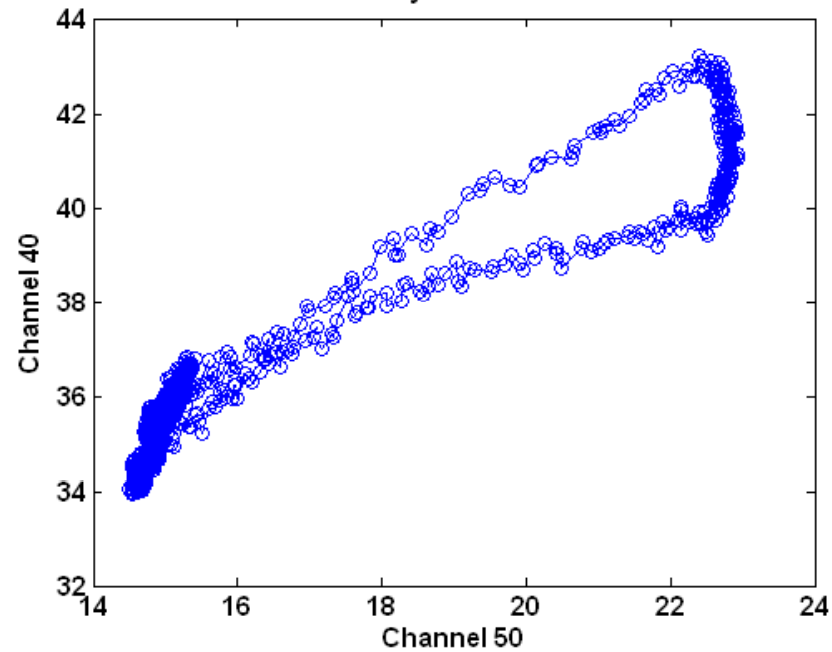
ELM cycle in 24089



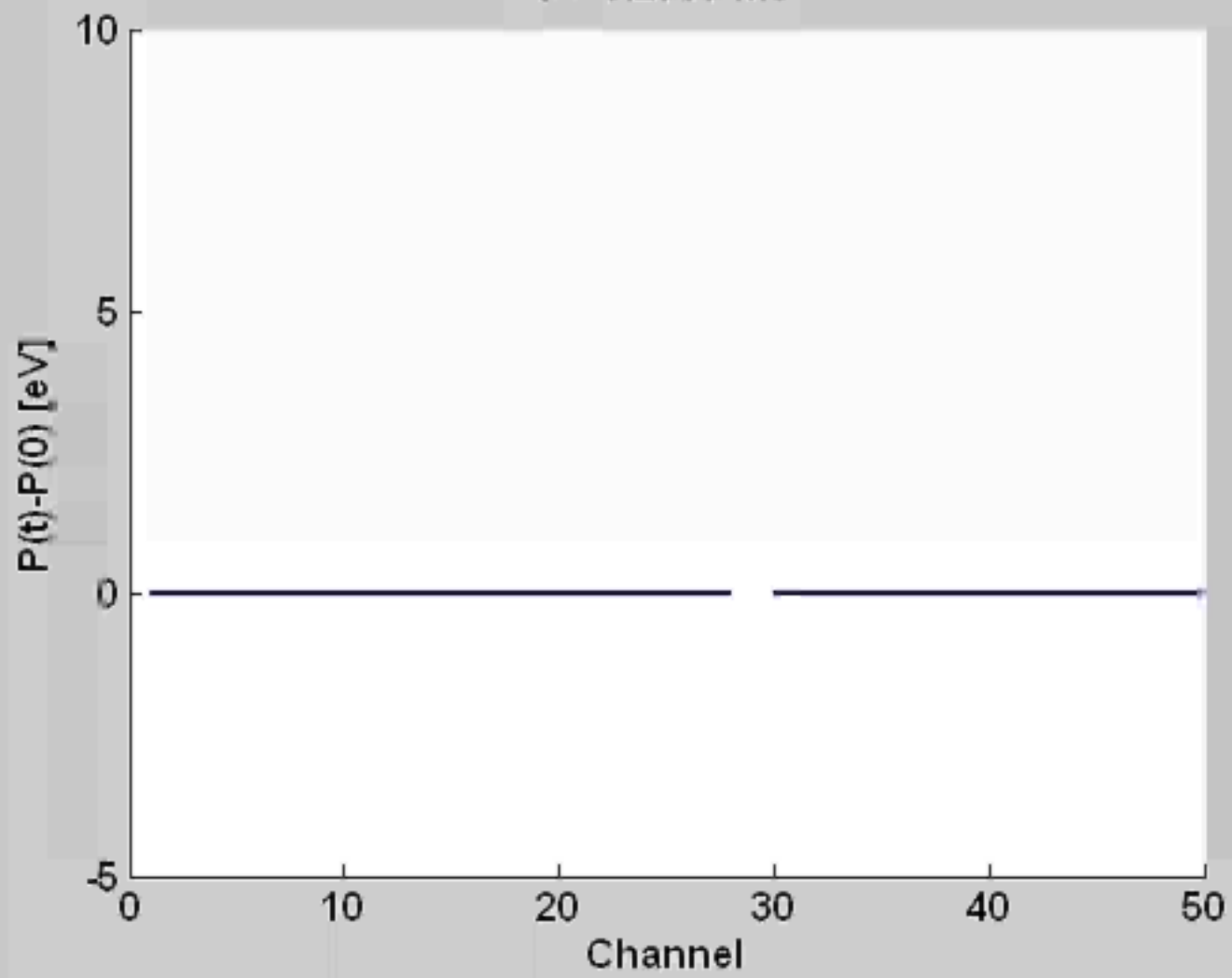
ELM cycle in 24089



ELM cycle in 24089

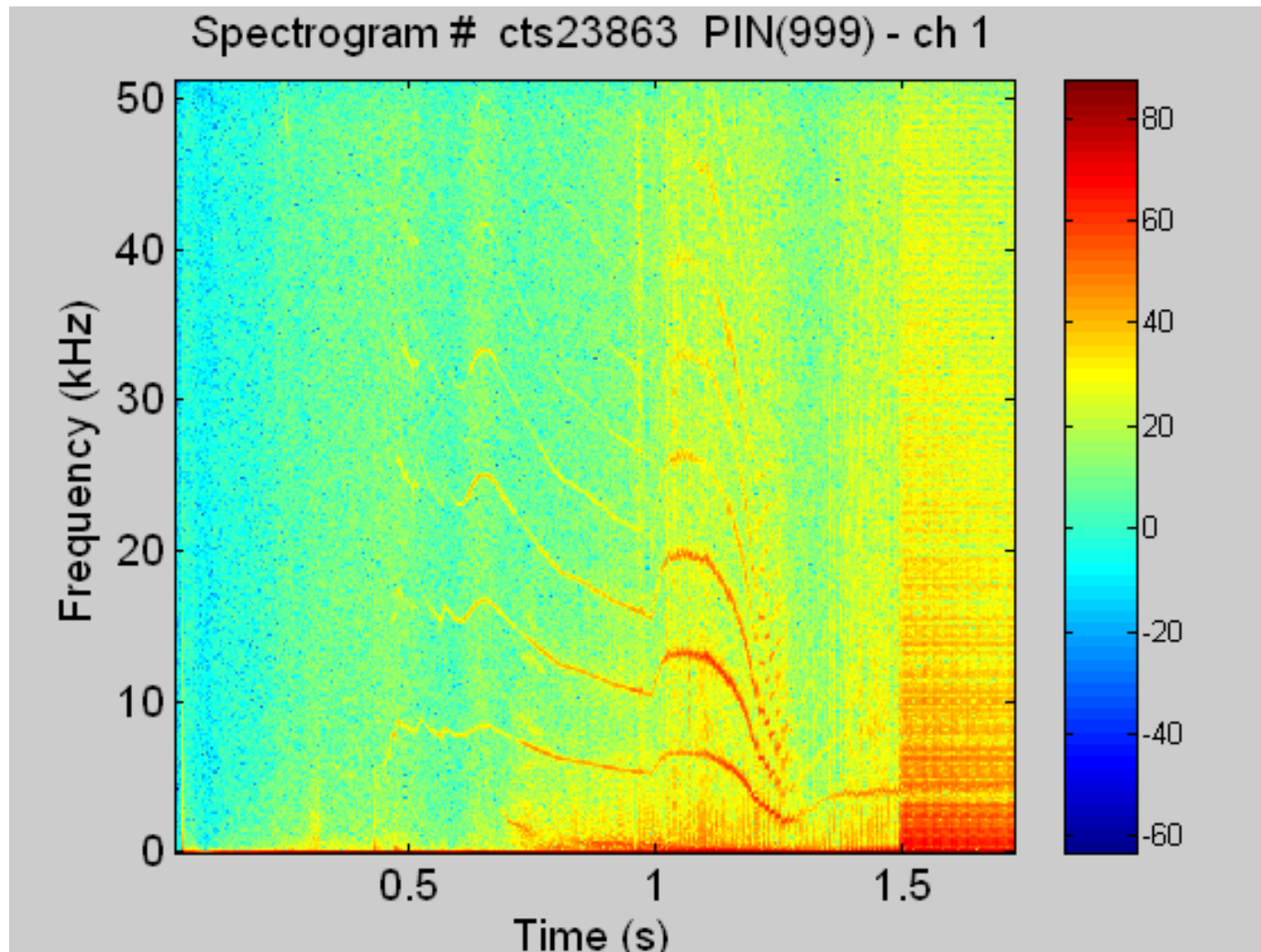


t = -6.2959 ms

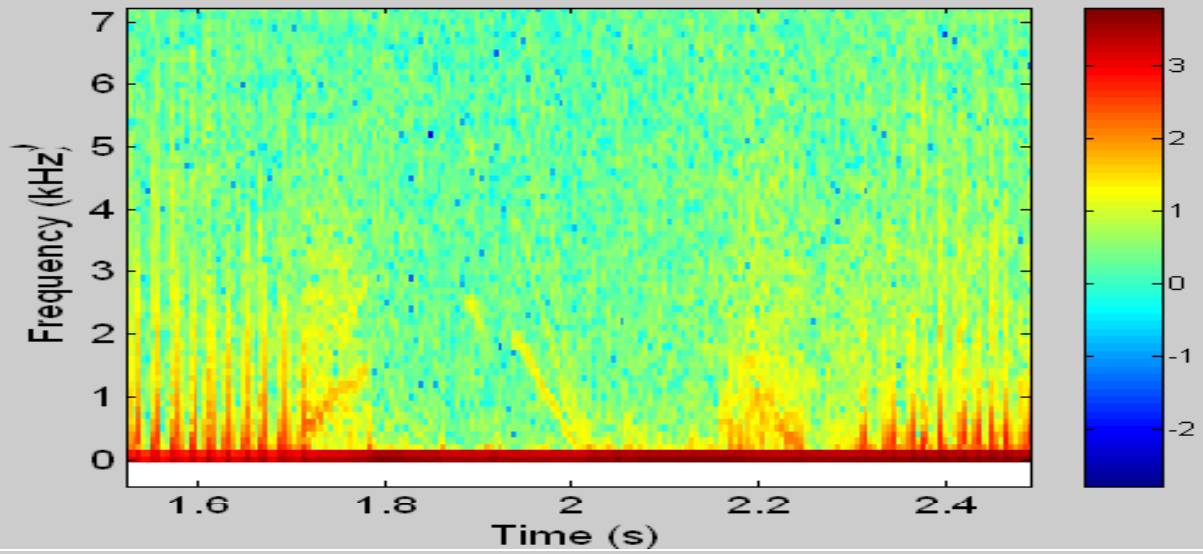


Modes in the ECE emission

- When the ECE emission is Fourier transformed some discharges display clear modes



Spectrogram # cts24099 PIN(999) - ch 1



CTS traces #24099

