

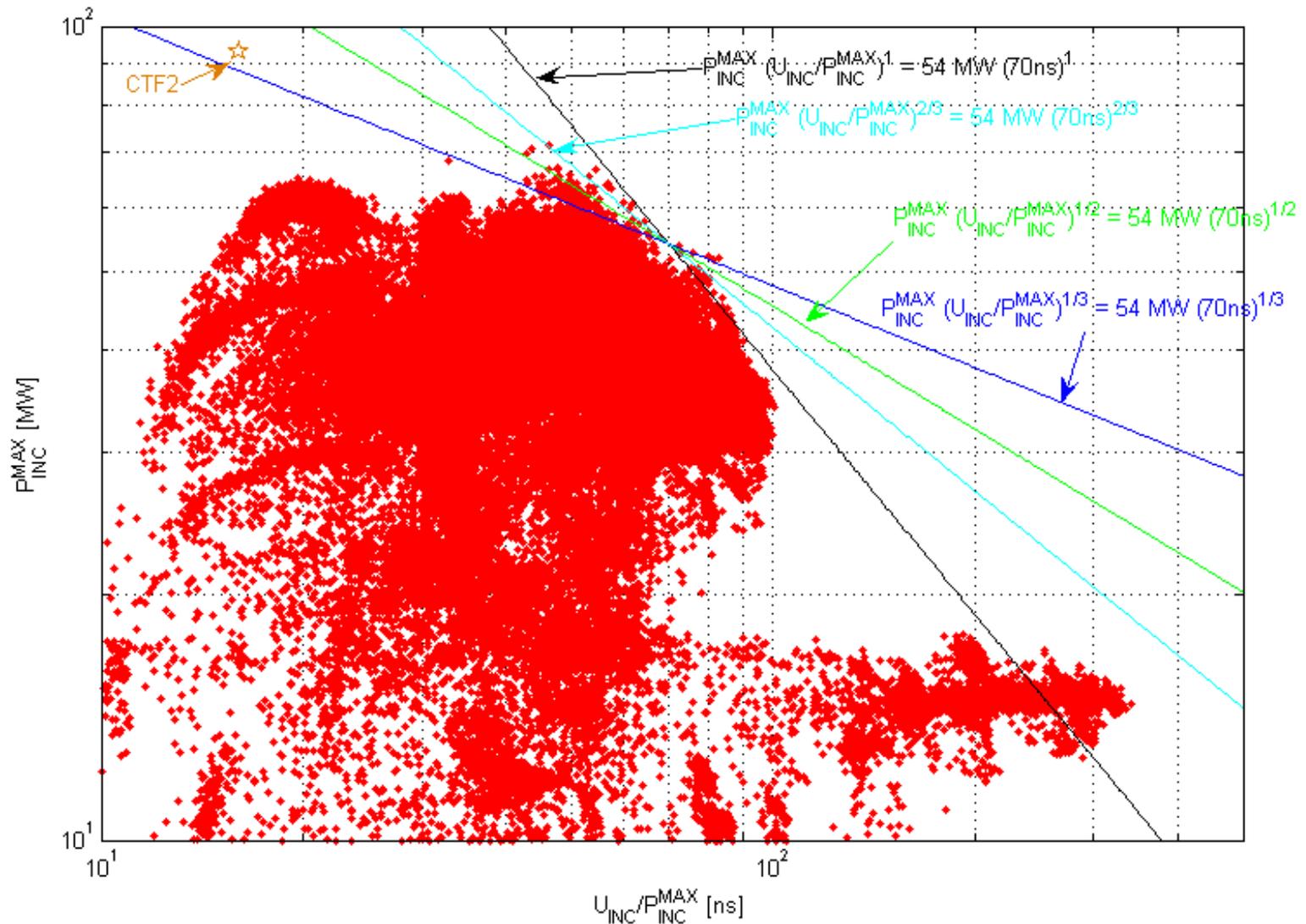
# **High-gradient Test Results of the 30 GHz Mo-Iris Structure**

J. Alberto Rodriguez

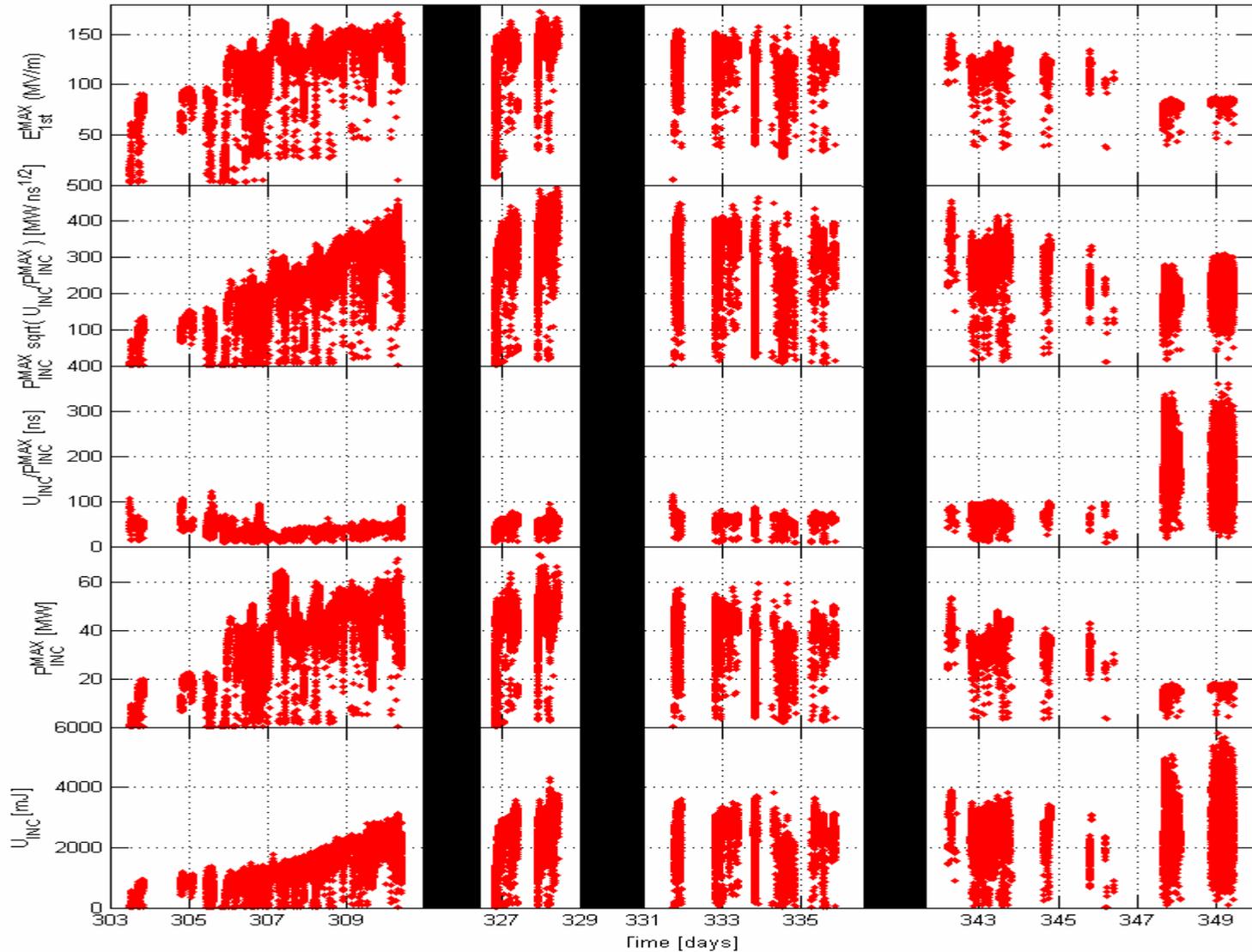
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- Conditioning
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- Summary

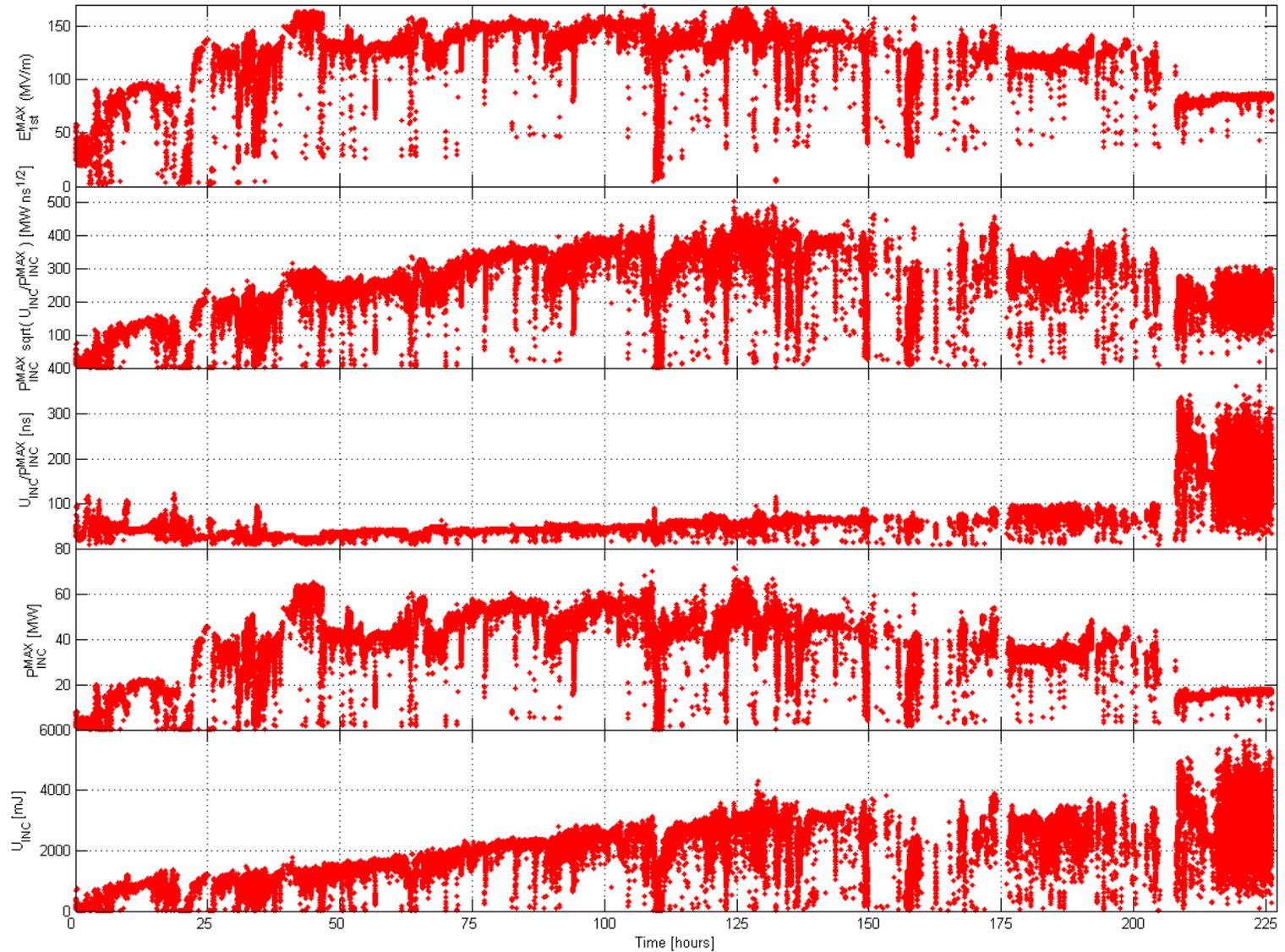
# Conditioning: Peak power vs. Pulse length



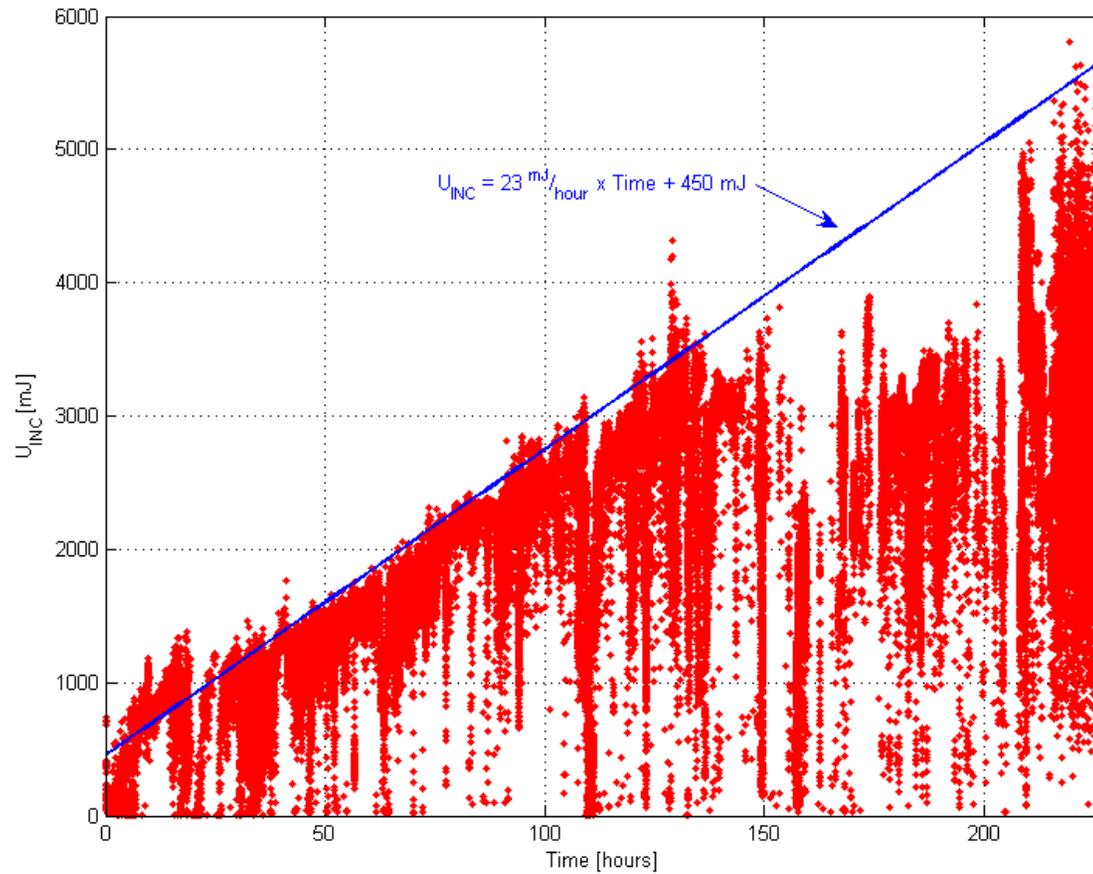
# Conditioning: History



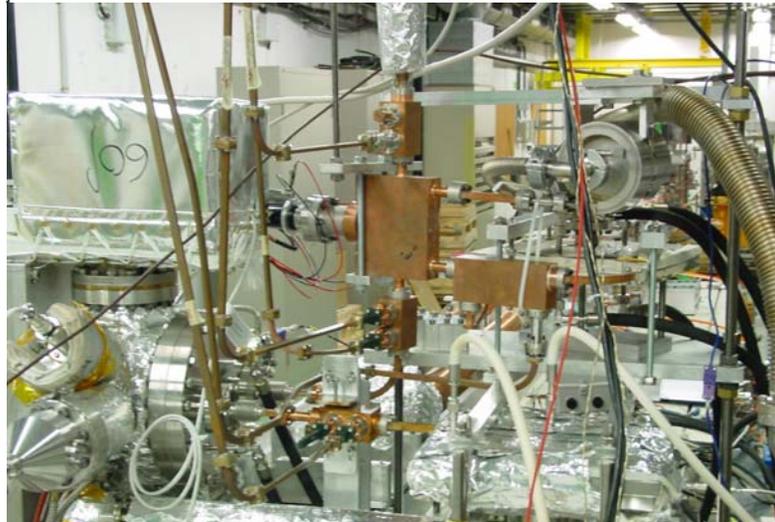
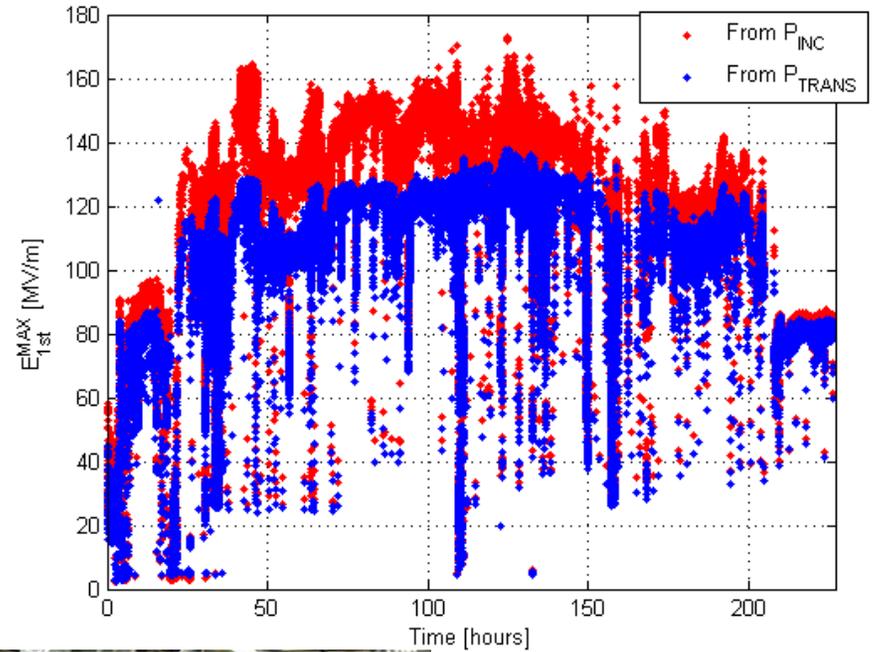
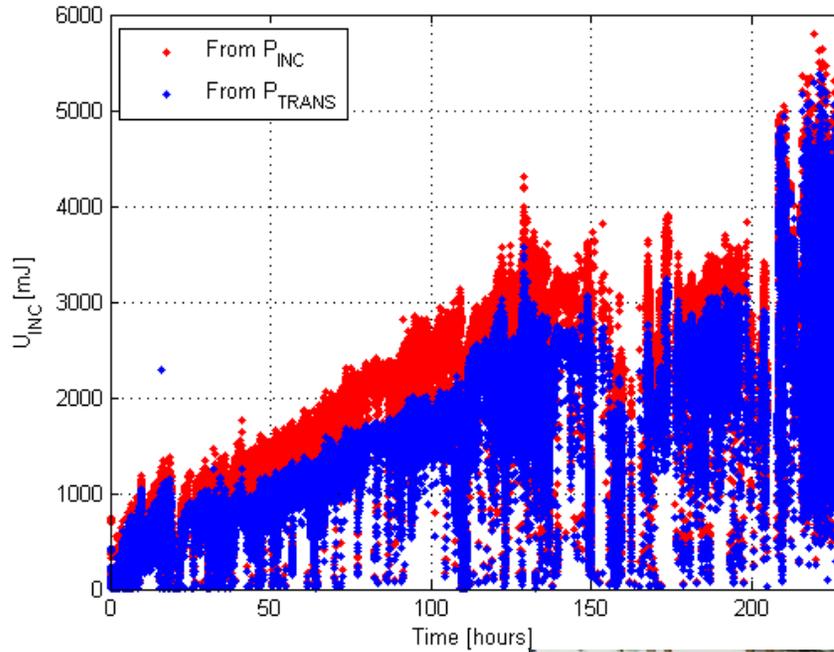
# Conditioning: Effective time



# Conditioning: Pulse energy vs. effective time

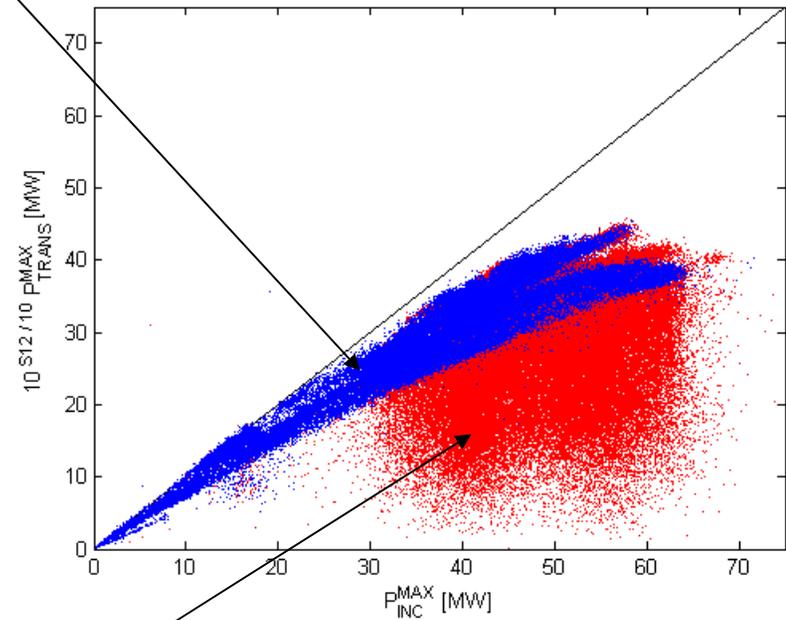
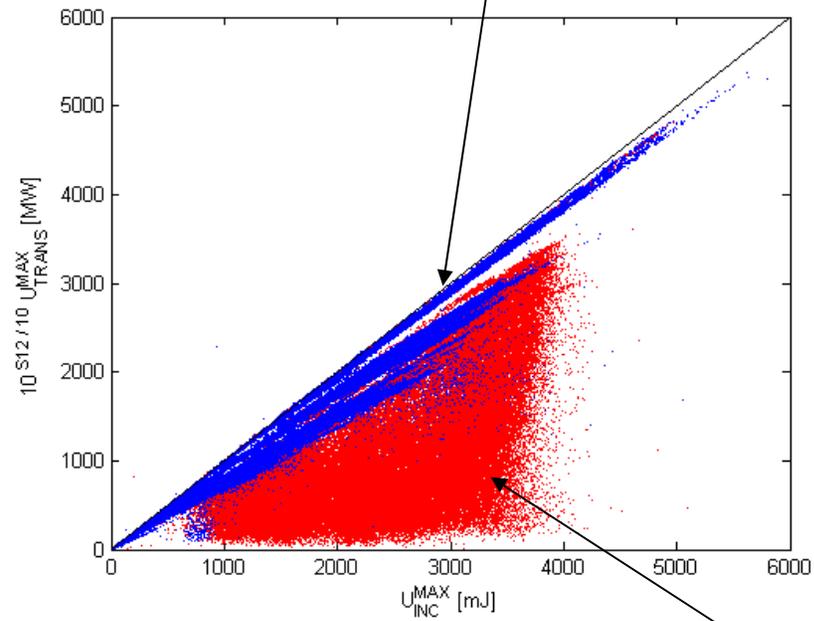


# Calibration uncertainty



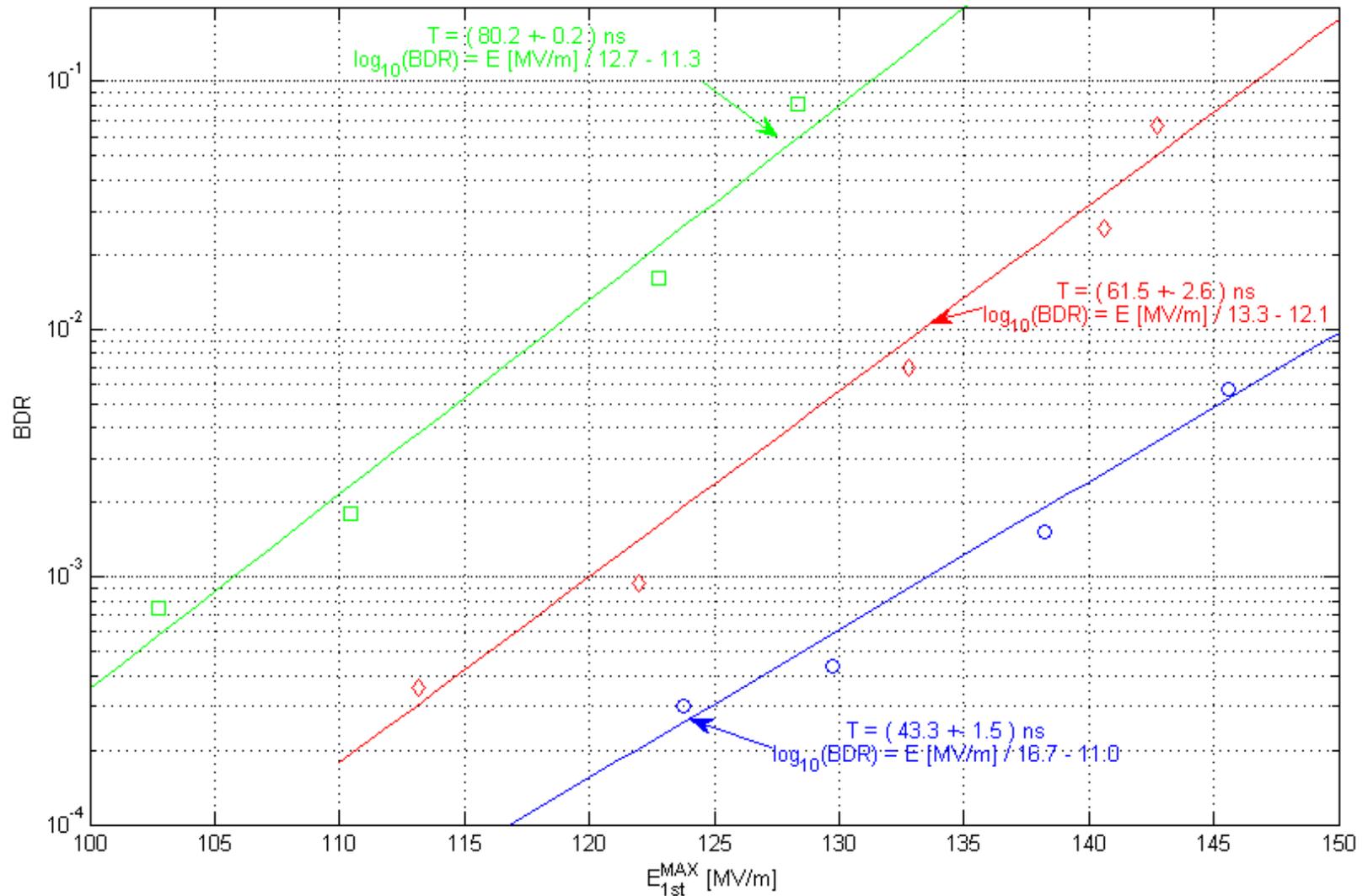
# Calibration uncertainty

Without Faraday cup event (in blue)

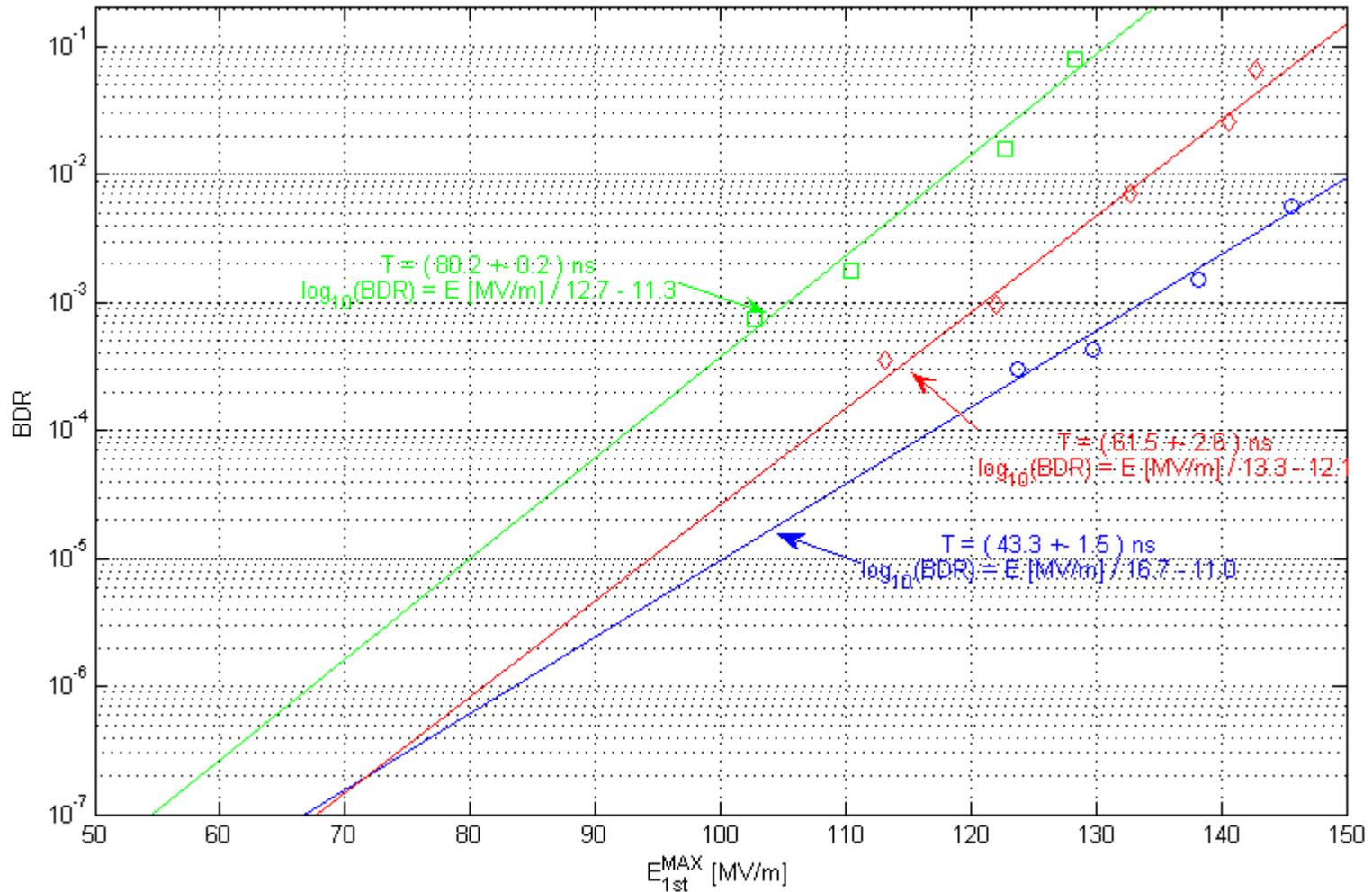


With Faraday cup event (in red)

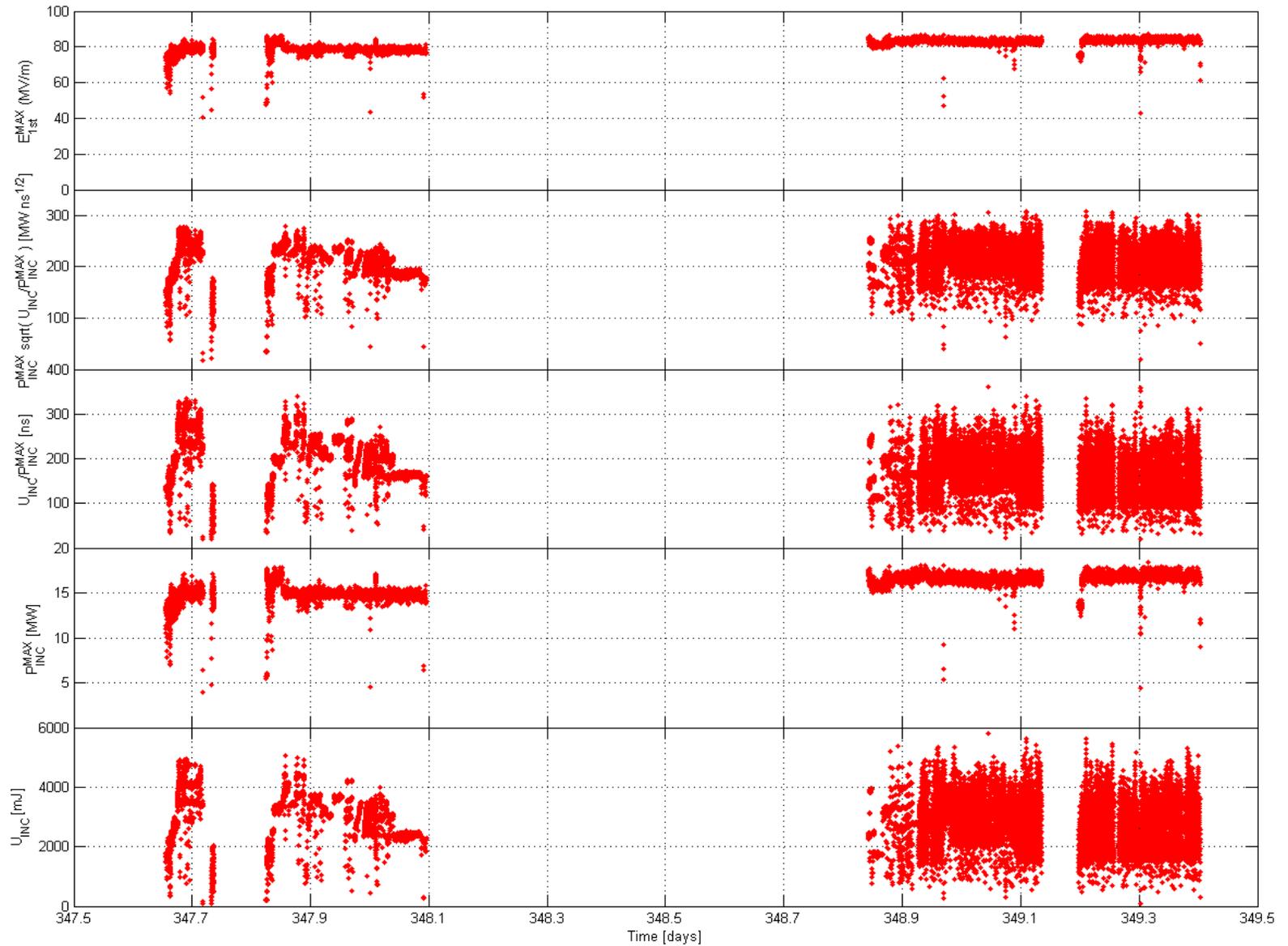
# Breakdown rate experiments



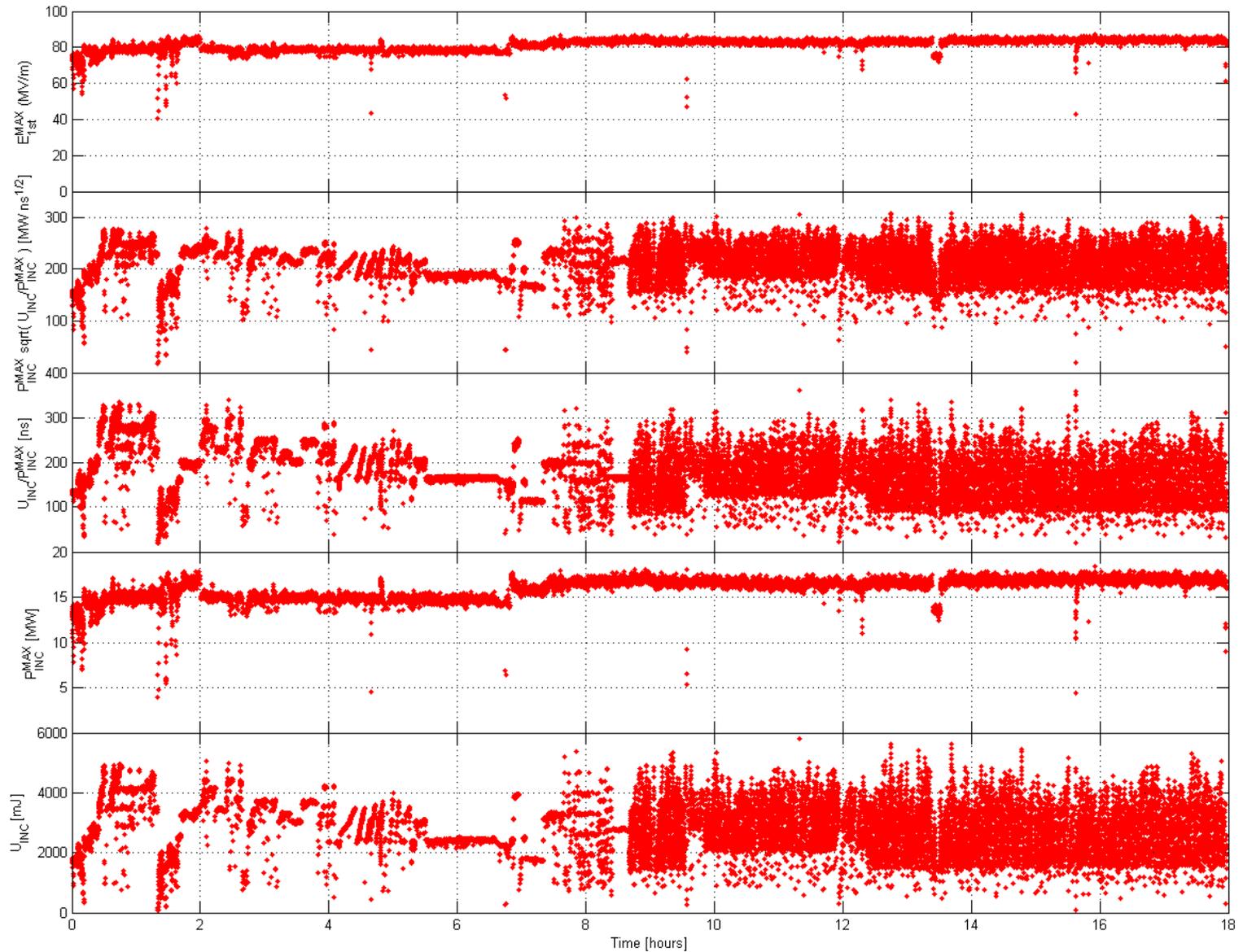
# Breakdown rate experiments



# Long pulses: History



# Long pulses: Effective time



# Long pulses: Automatic conditioning

Vacuum Interlock

Disable gun

Wait for a period of time (~ 10-20 seconds)

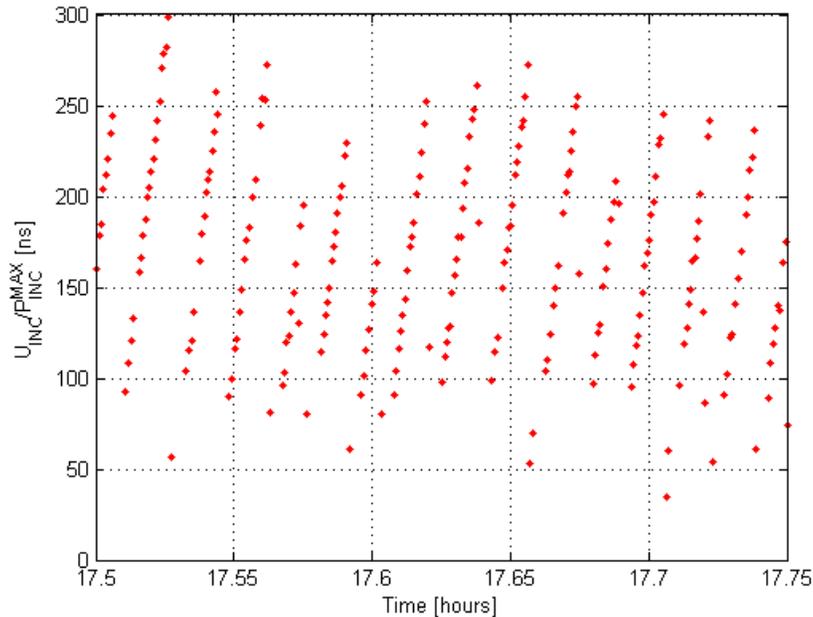
Reduce pulse length

Start the gun

Repeat until vacuum interlock

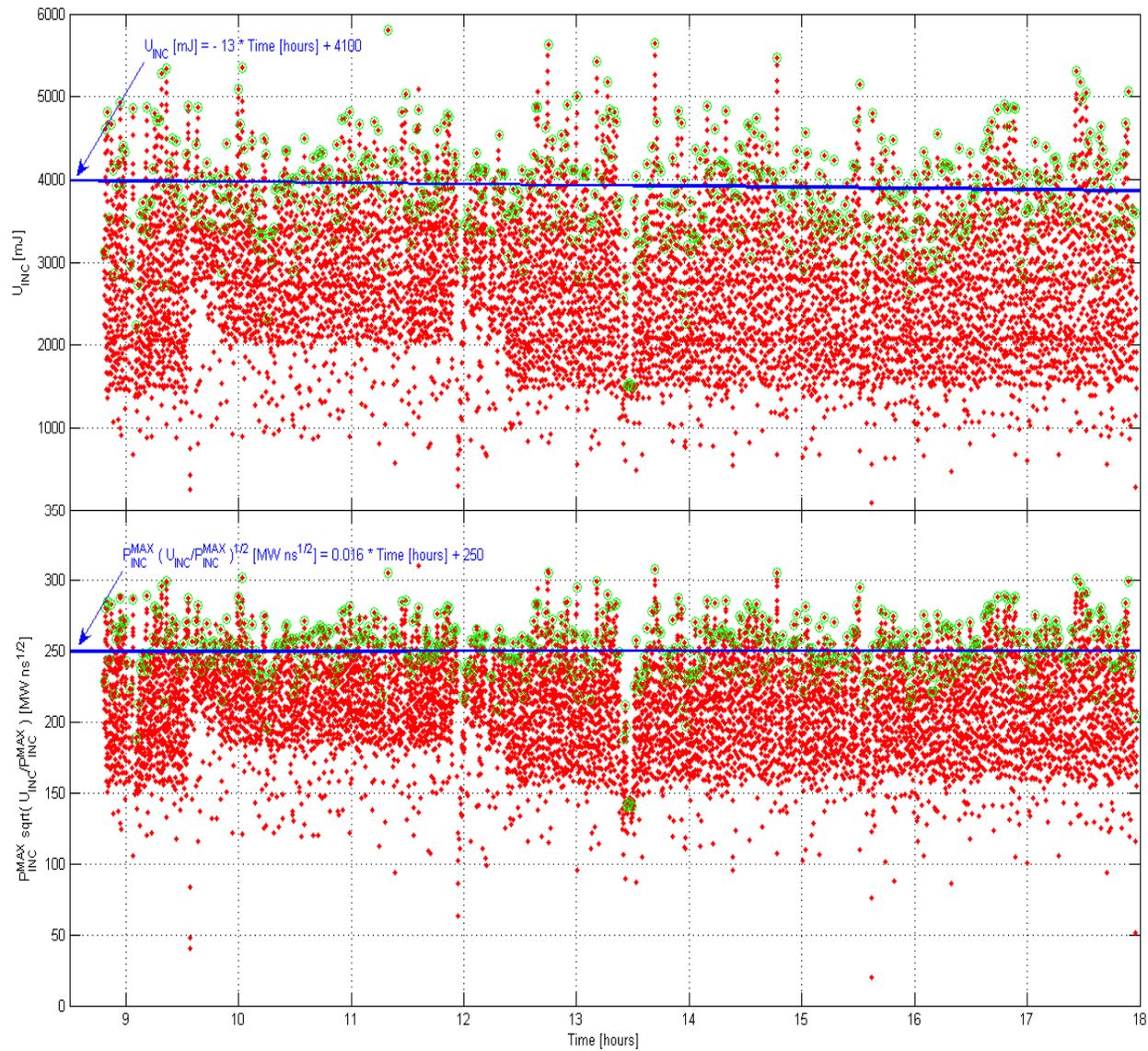
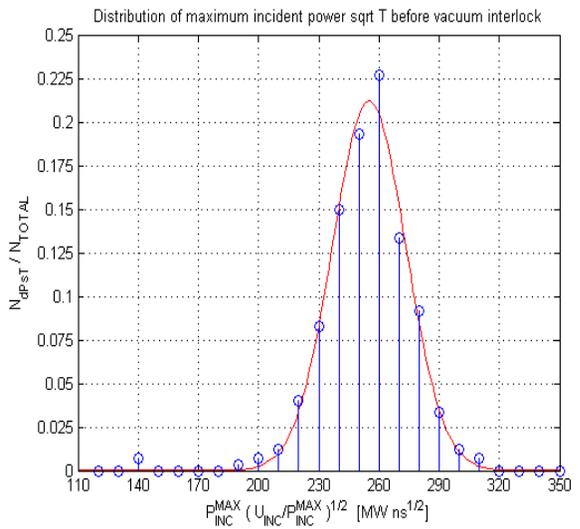
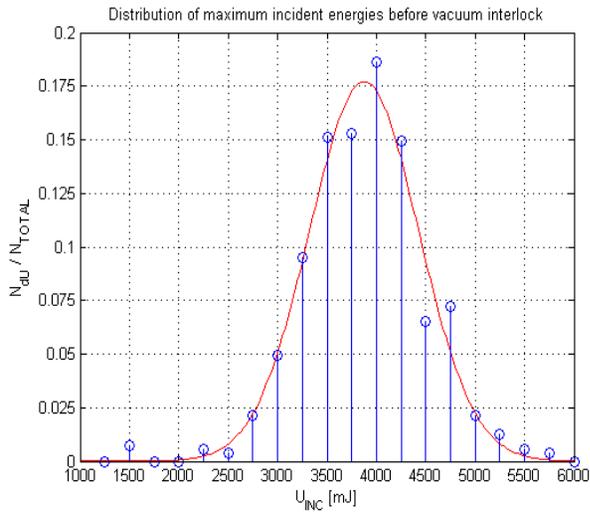
Wait for a period of time (~1 second)

Increase the pulse length (~ 10 ns)

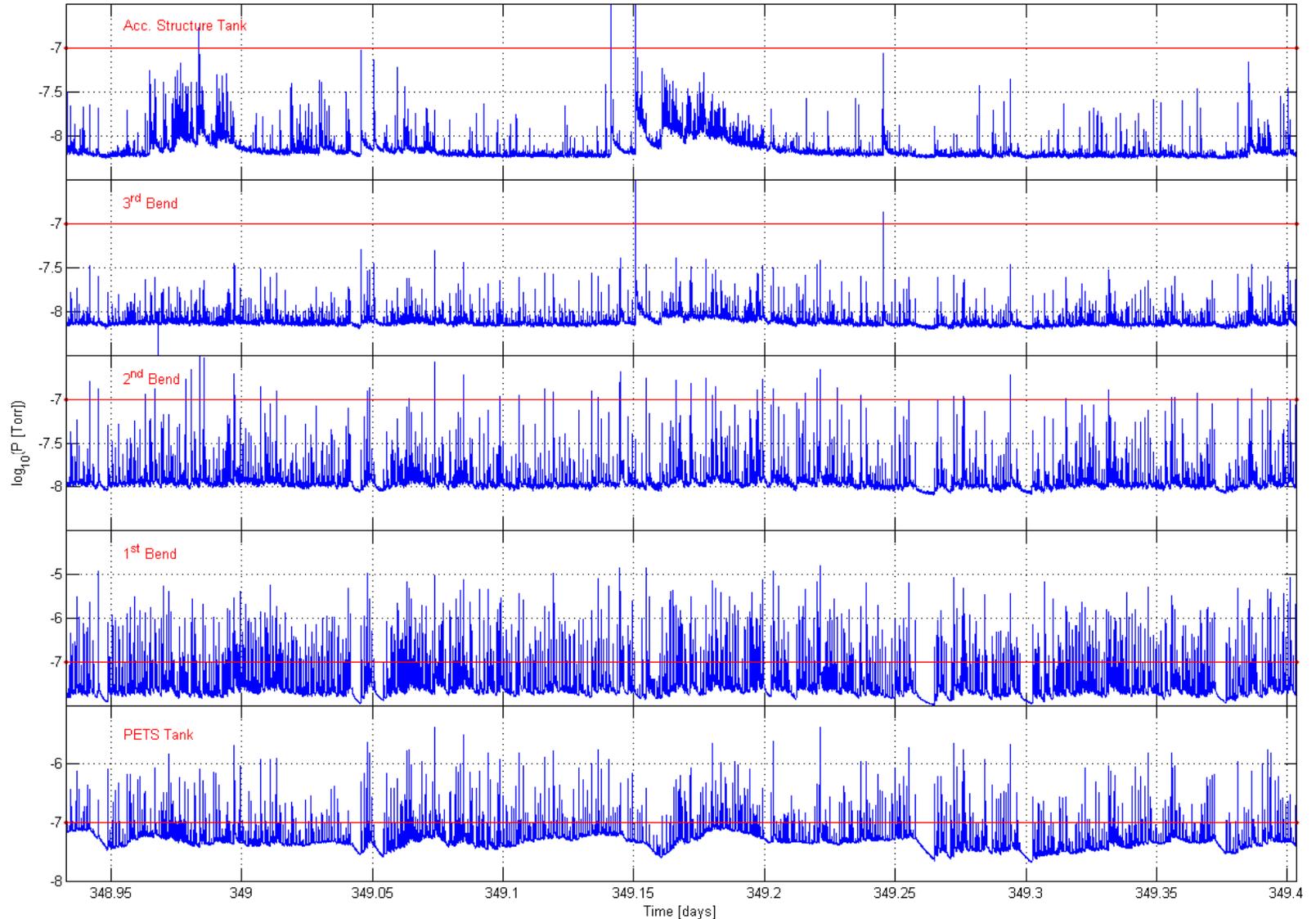


- Effective time: 9.3 hours
- 8180 waveforms were captured
- 167 faraday cup events ( $\min(V_{fc}) < -0.1$ )
- ~2% of the captured waveforms showed a faraday cup event
- 569 series in the 8180 waveforms. A series is started after a vacuum interlock occurred.
- Out of the 569 series, 105 end with a faraday cup event.

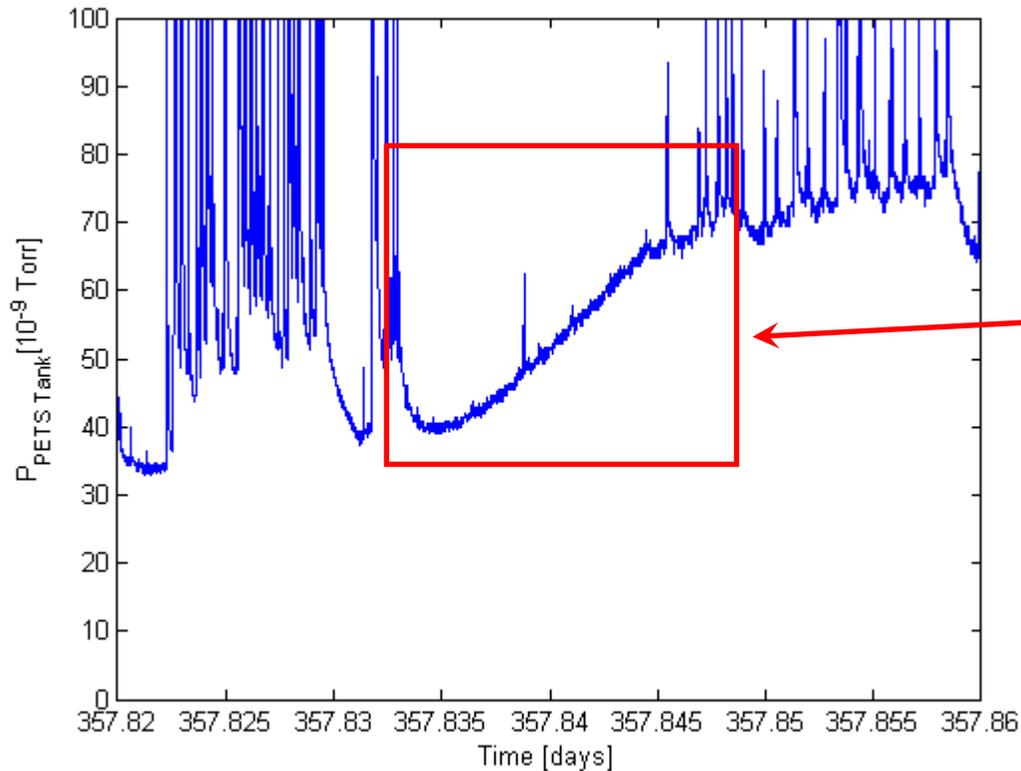
# Long pulses: Progress of conditioning



# Pressure in the system: History

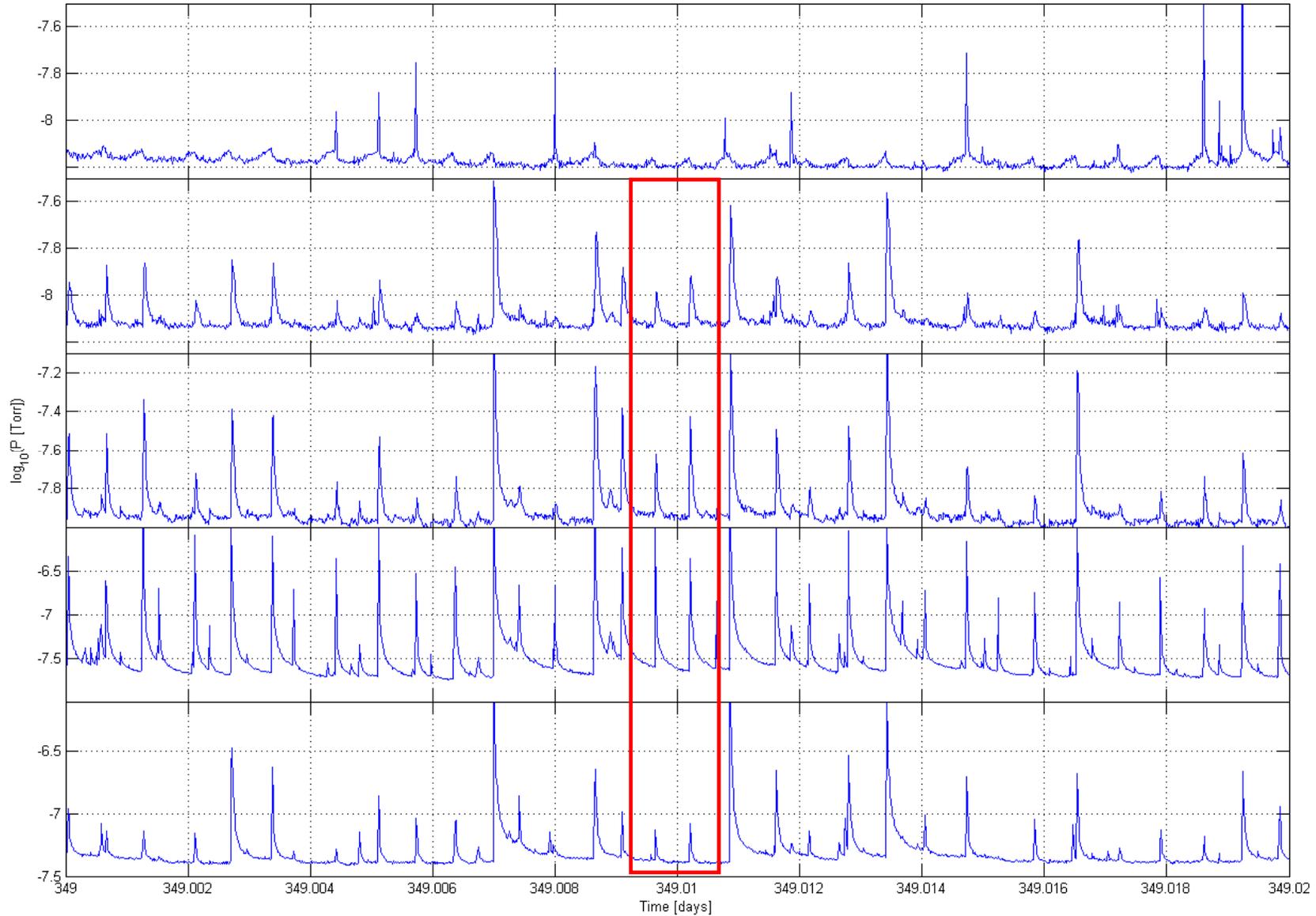


# Pressure in the system: Pressure raise

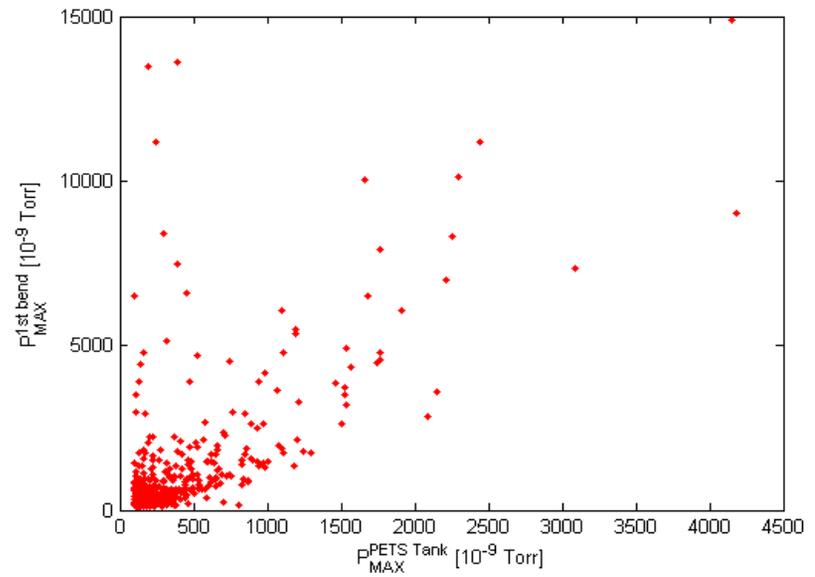
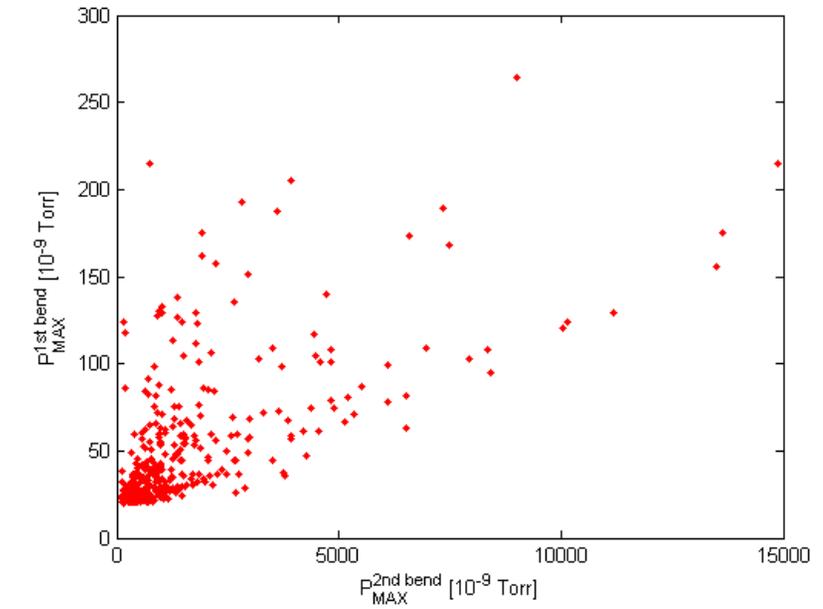
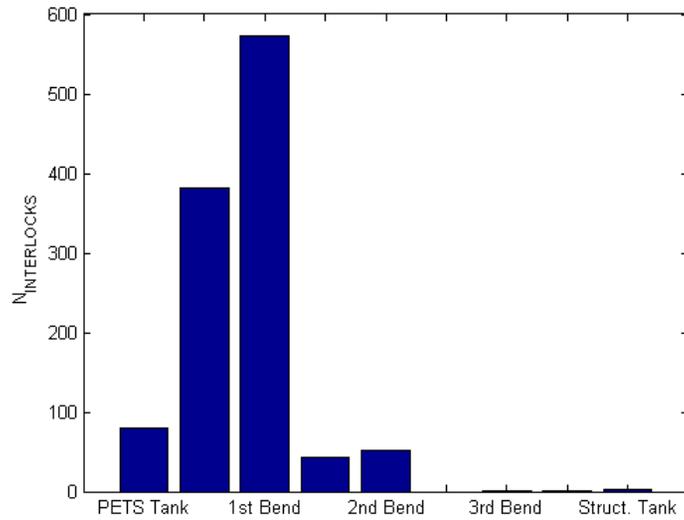


Vacuum pressure steadily increased when power was produced even if no breakdown activity was observed.

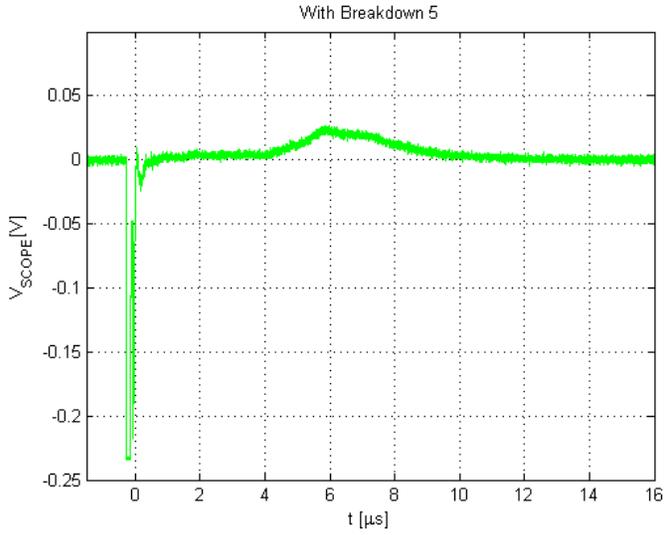
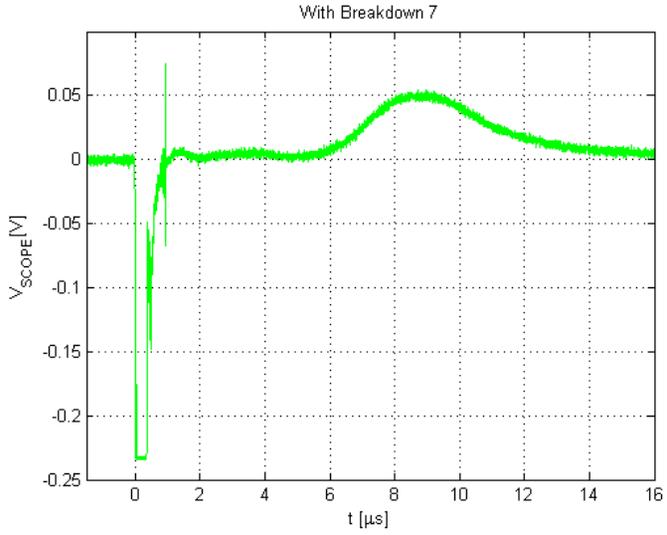
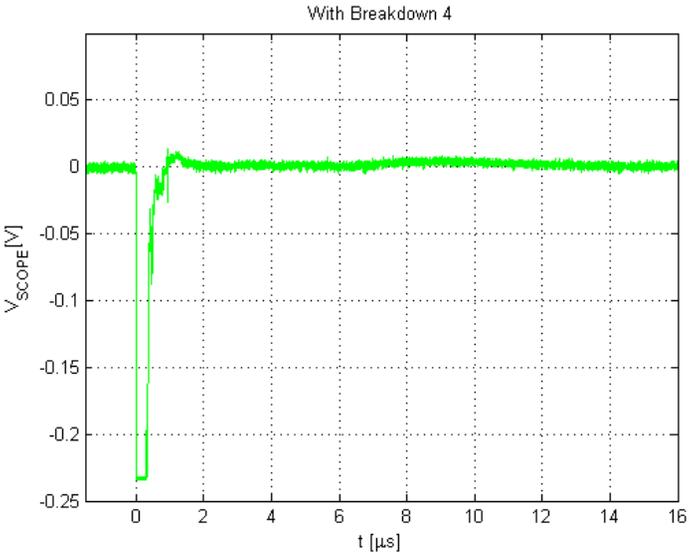
# Pressure in the system



# Pressure in the system



# Faraday Cup signals



# Conclusion

- CTF2 results for Mo-iris structure were achieved (with reasonable assumptions on the pulse length dependence)
- Gradients close to 150 MV/m were achieved for pulse lengths close to 70 ns (although pulses were not very square)
- Breakdown rates for those gradients and pulse lengths are still very high
- Uncertainty in the calibration still remains due to a non-linearity (10-15% possible errors in gradient)
- Positive ion current was observed in the Faraday cup