Title

The GOLEM tokamak for 5^{th} IAEA Joint Experiment

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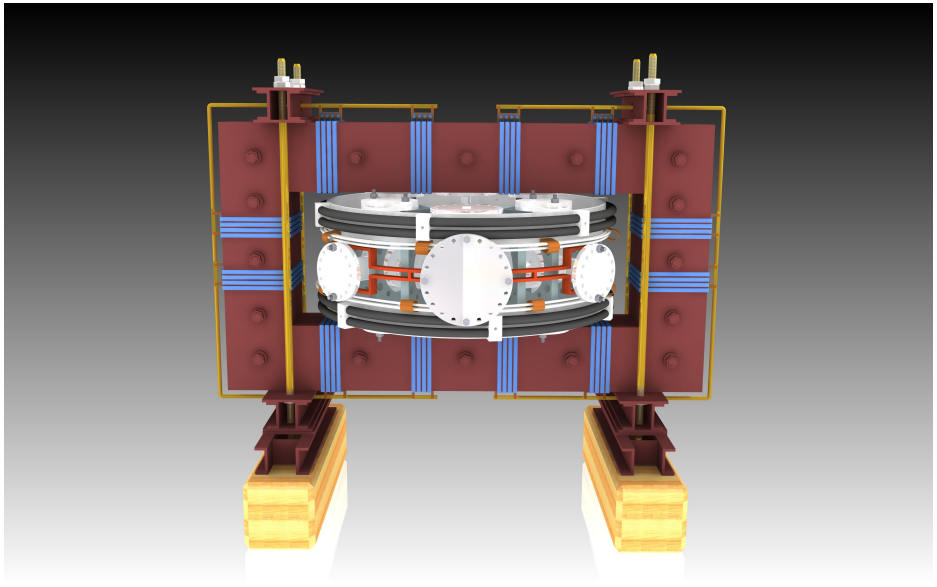
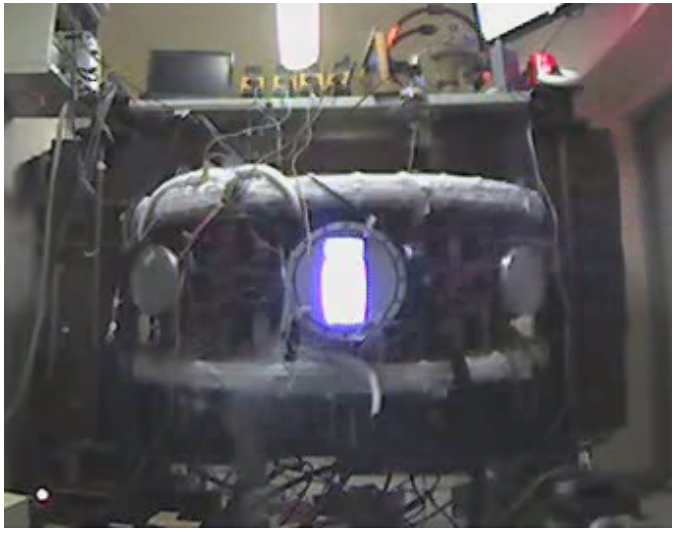


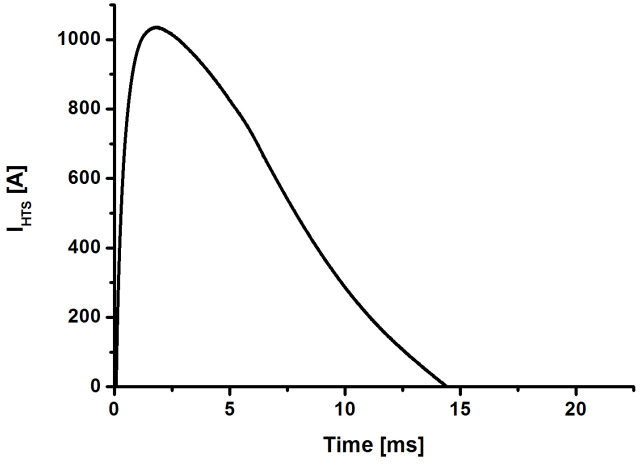
Content

Tokamak GOLEM for IAEA Joint Experiment
3 experiments

- Characterise resistivity dependence of HTS coils on current. golem
- Tests of HTS switch on GOLEM tokamak.
- Installation and investigation of RF pre-ionisation on GOLEM tokamak.

High Temperature Superconductors first ever used on tokamak

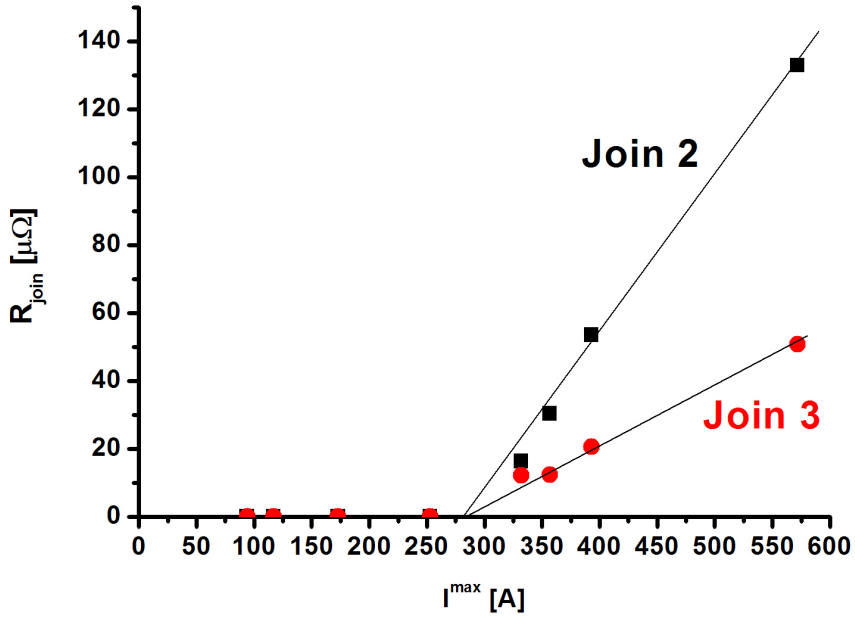




- 6 turns of the 2nd generation HTS (Re)BCO tape SCS12050-AP.
- Current ramp-up speed of up to ≈ 0.6 MA/s .
- Current through the tape ≈ 1 kA.
- Little "quench" effects observed for perpendicular magnetic field up to 0.5T

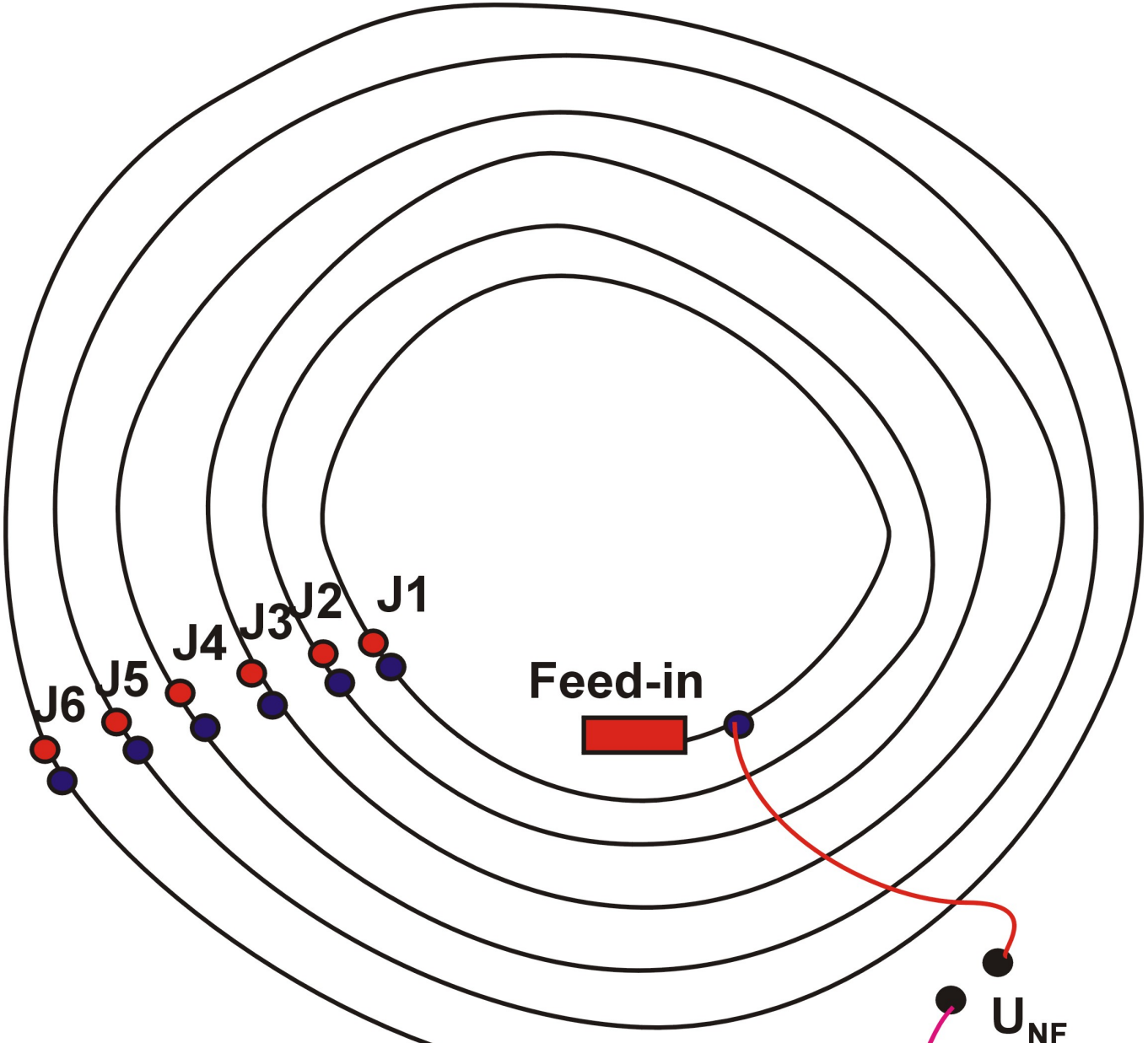
video

Task I: Characterise resistivity dependence of HTS coils on current.

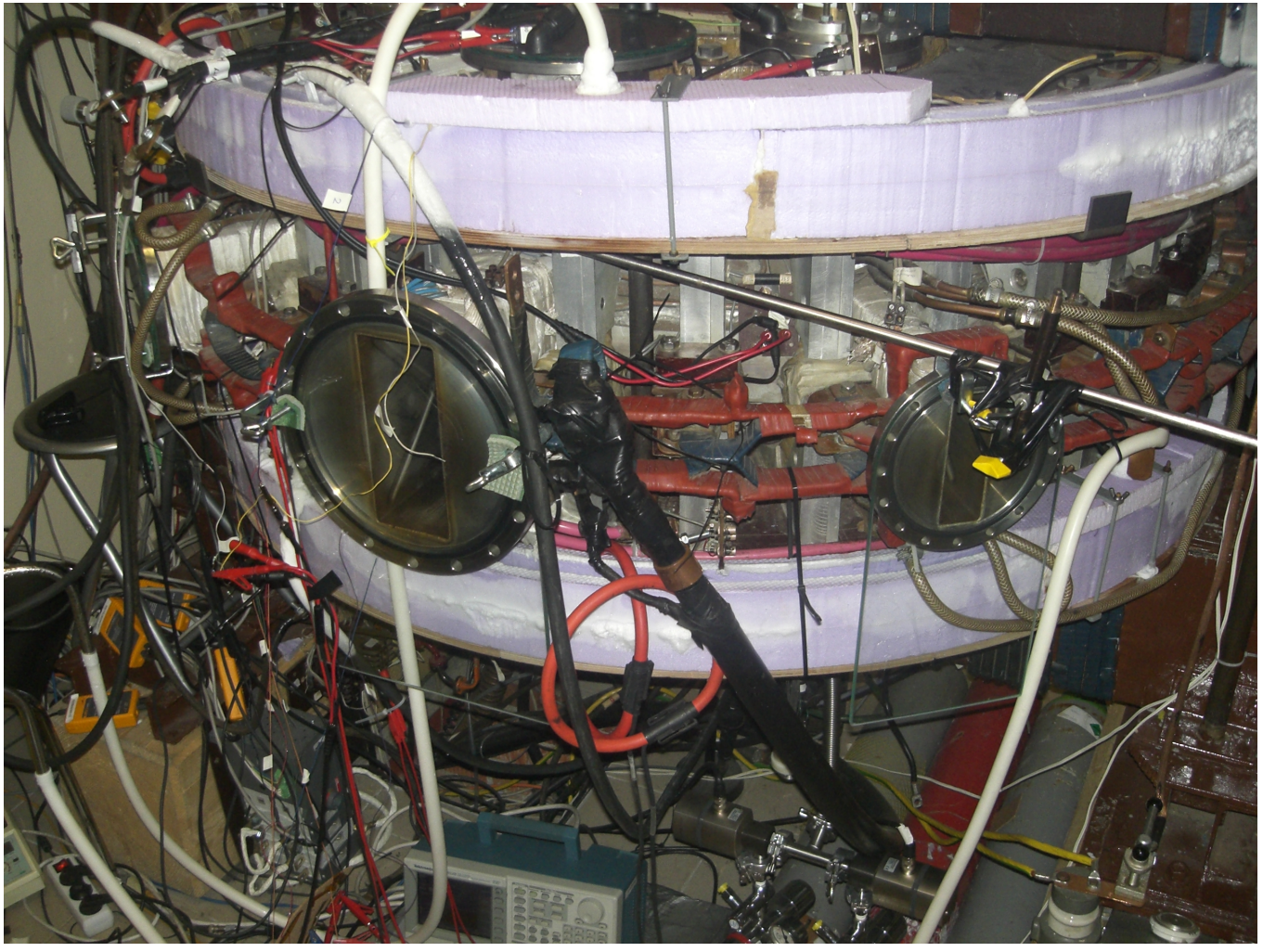


- Background: Previous observation showed sudden increase in HTS resistivity above 250-300A of HTS current.
- Goal: To get more detailed data at the point of transition.
- Goal: To understand conditions and consequences of current quenches.

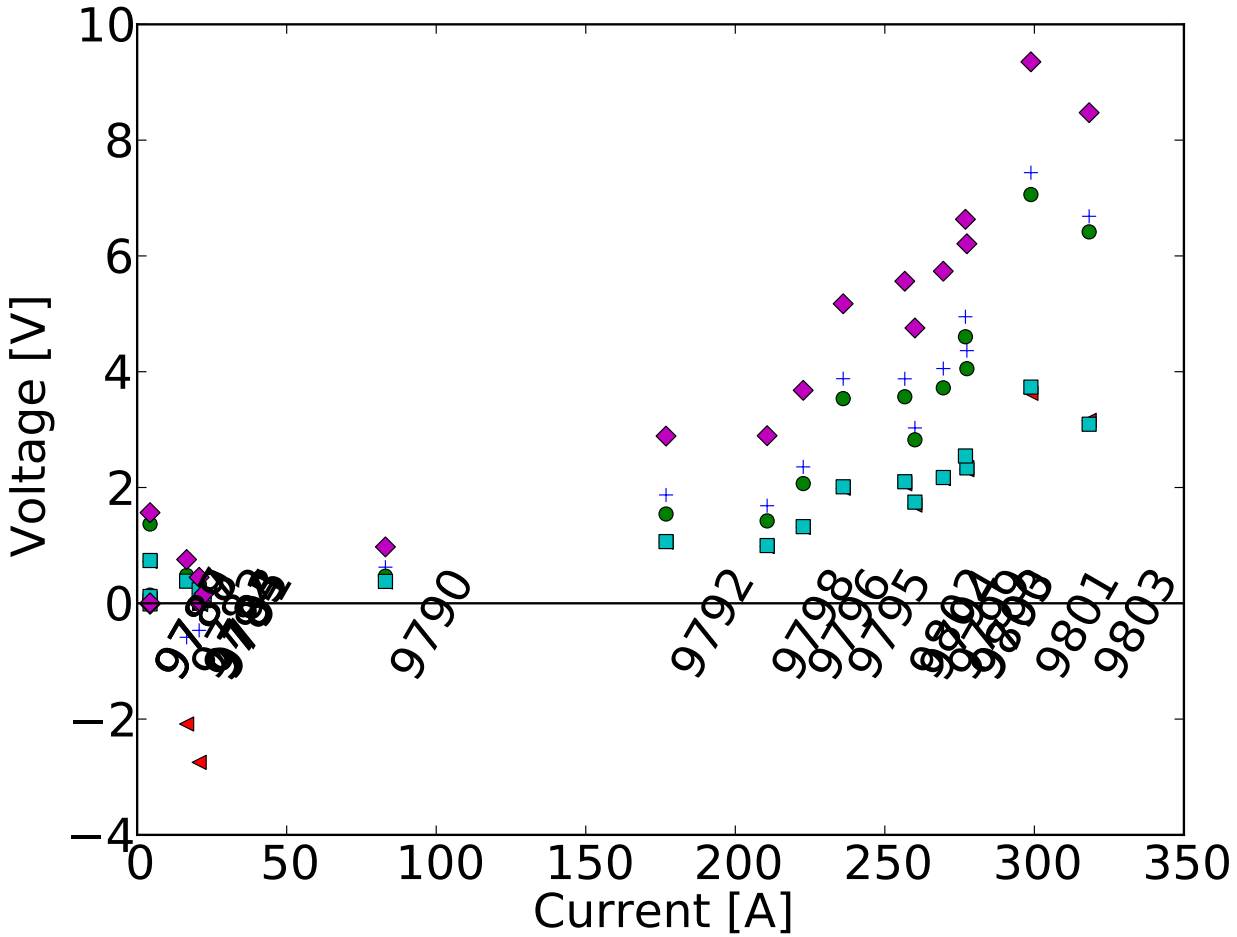
Experimental Setup II



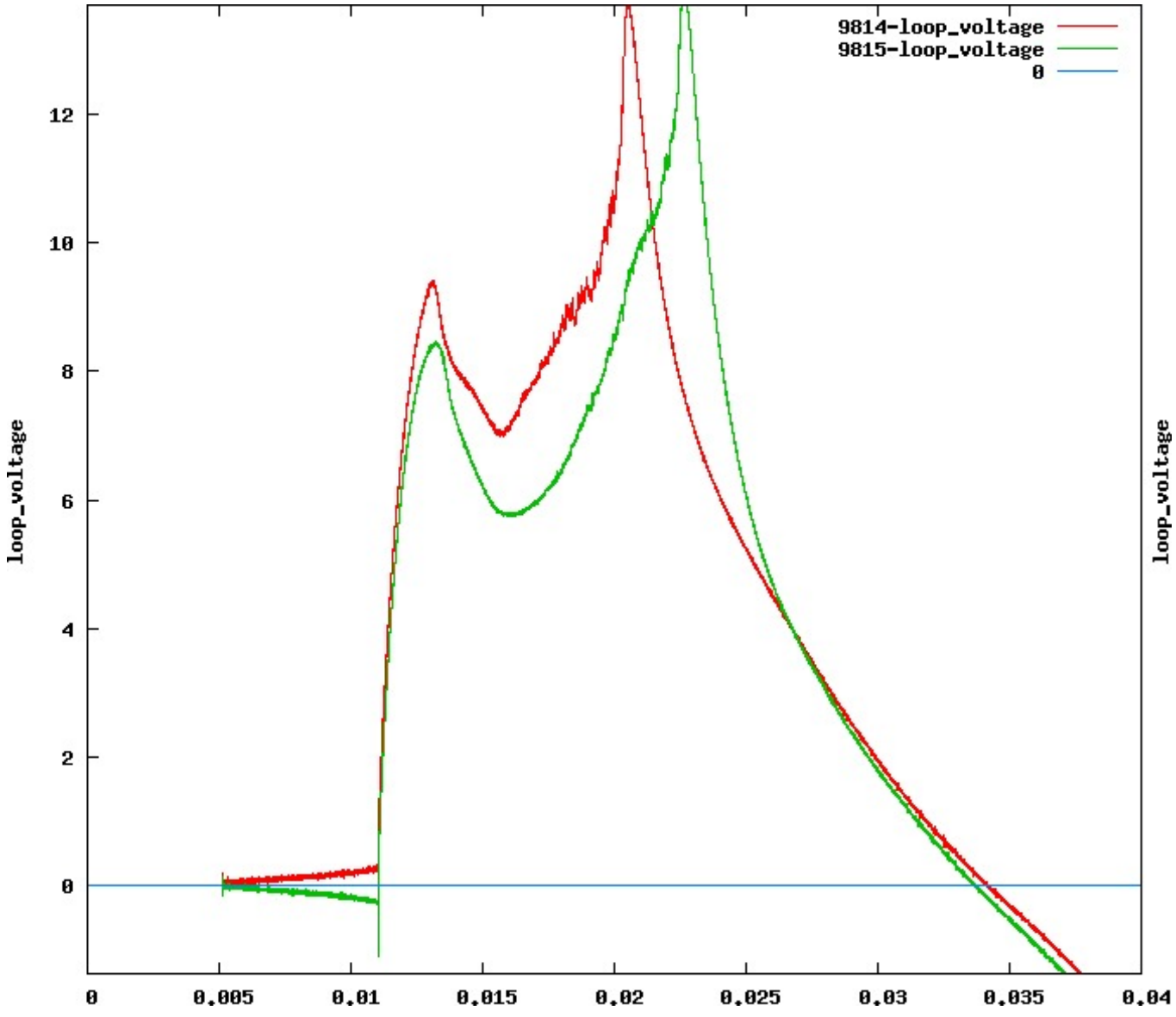
Experimental Setup I



Results


Voltage [V]
Current [A]
10
8
6
4
2
0
−2
−4
0
50
100
150
200
250
300
350
9790
9792
9798
9796
9795
9801
9803

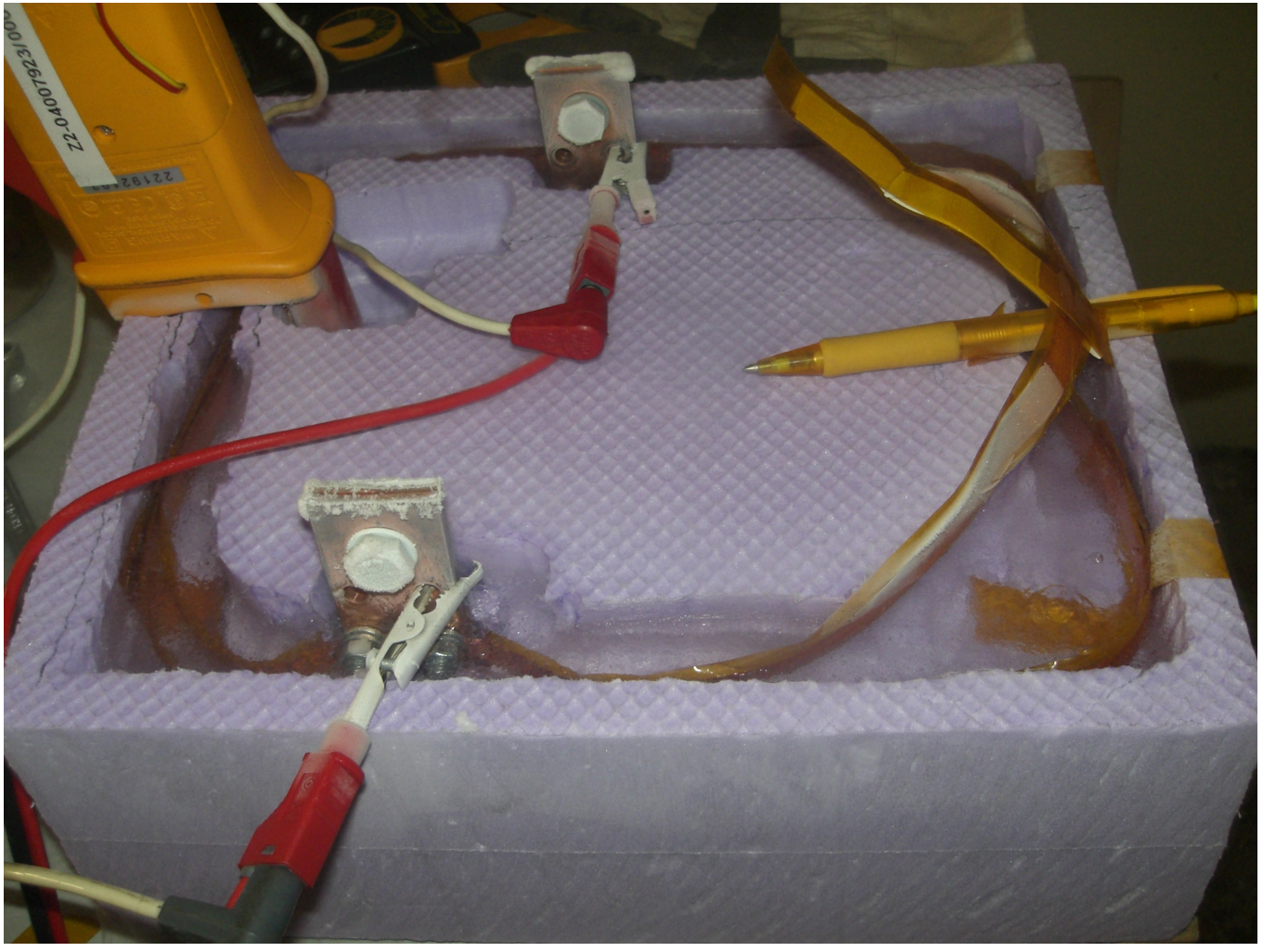
Horizon: Plasma & $I_{HTS} = 85$A (discharge 2 ms prolongation)



Task II: Tests of HTS switch on GOLEM tokamak

- Background:
  - 3 types of power supply for Golem HTS: inductive, DC PS, capacitor bank.
  - Simplification of PS on Golem: operate HTS coil without any current supply.
- Scope and Method:
  - Install a HTS short-cut above the level of liquid N
  - After energising the coil with DC PS, add LN to make the shortcut superconducting and switch off the PS
  - Let the current decay and measure the decay time.
- The next step may be installation of heated short-cut which will operate after the heating is switched off.

Experimental Setup (Step I: Table Top Experiment)

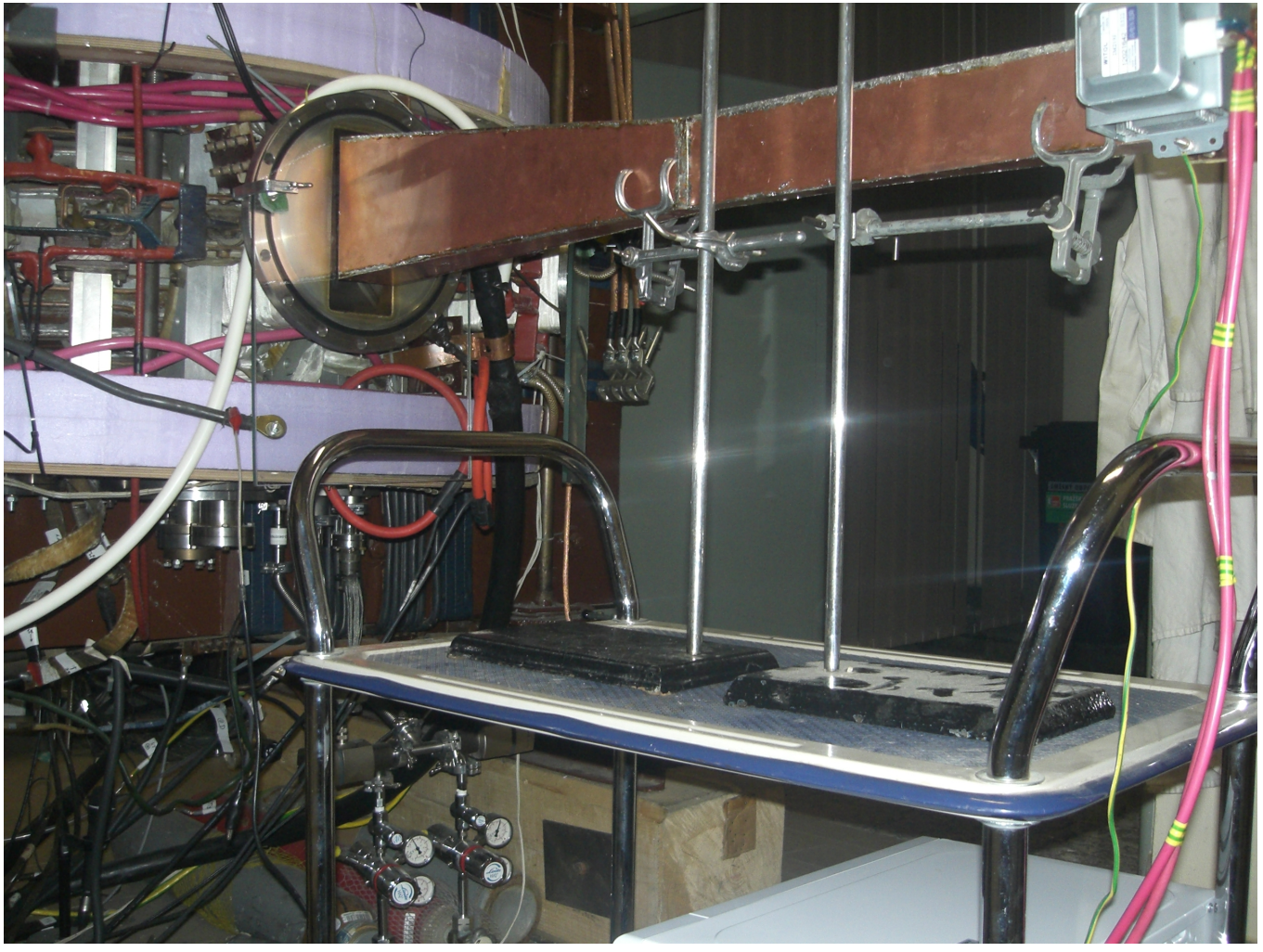


Extremely low inductance (and lack of time) - no results

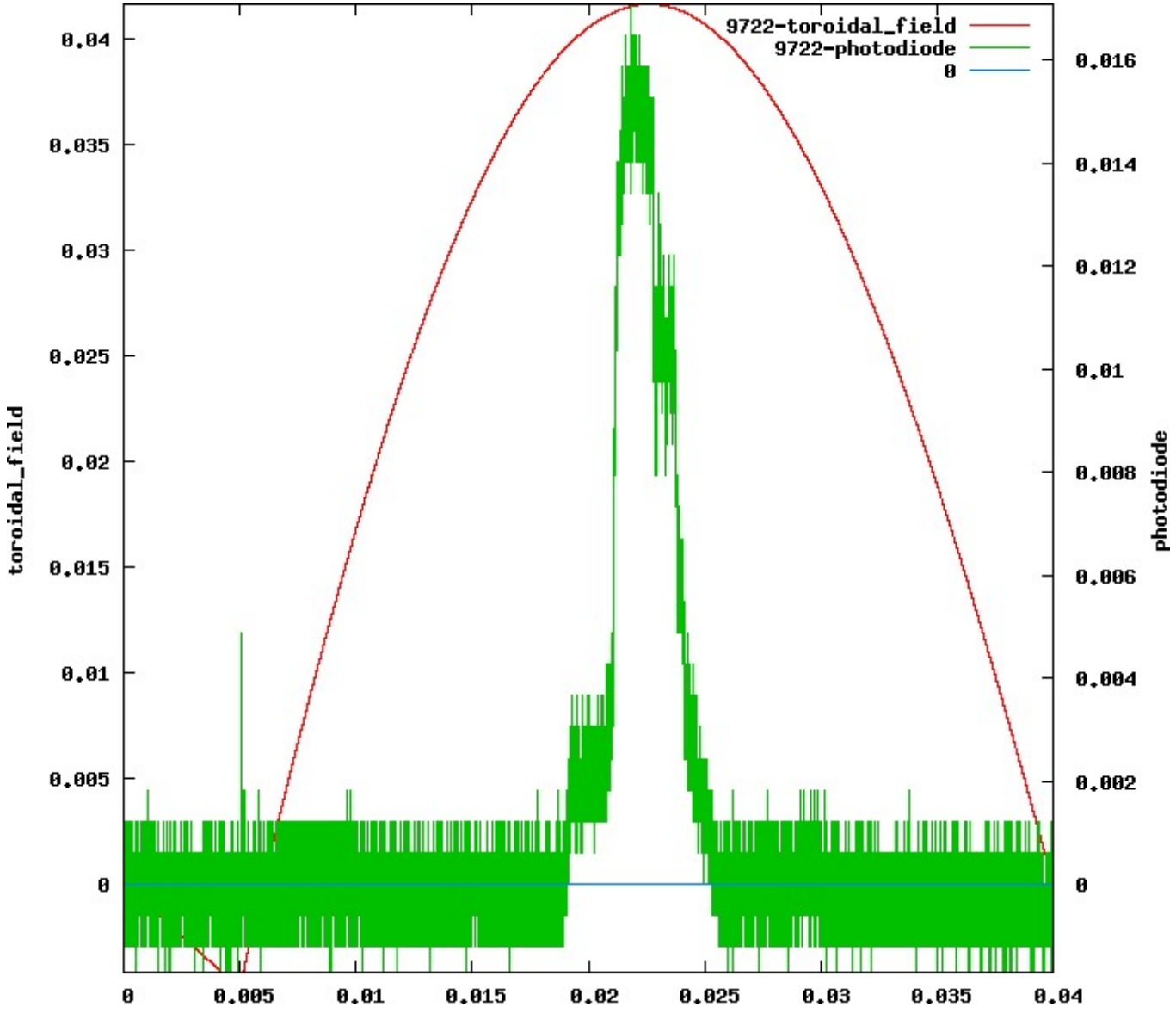
Task III: Installation and investigation of RF pre-ionisation on GOLEM tokamak

- Background: RF pre-ionisation is a tool to to reduce AC losses during current ramp-up in HTS coils.
- Scope: to install a low-power magnetron at the EC fundamental harmonics for the toroidal field of 0.1T at 2.45GHz, 800W injected power.

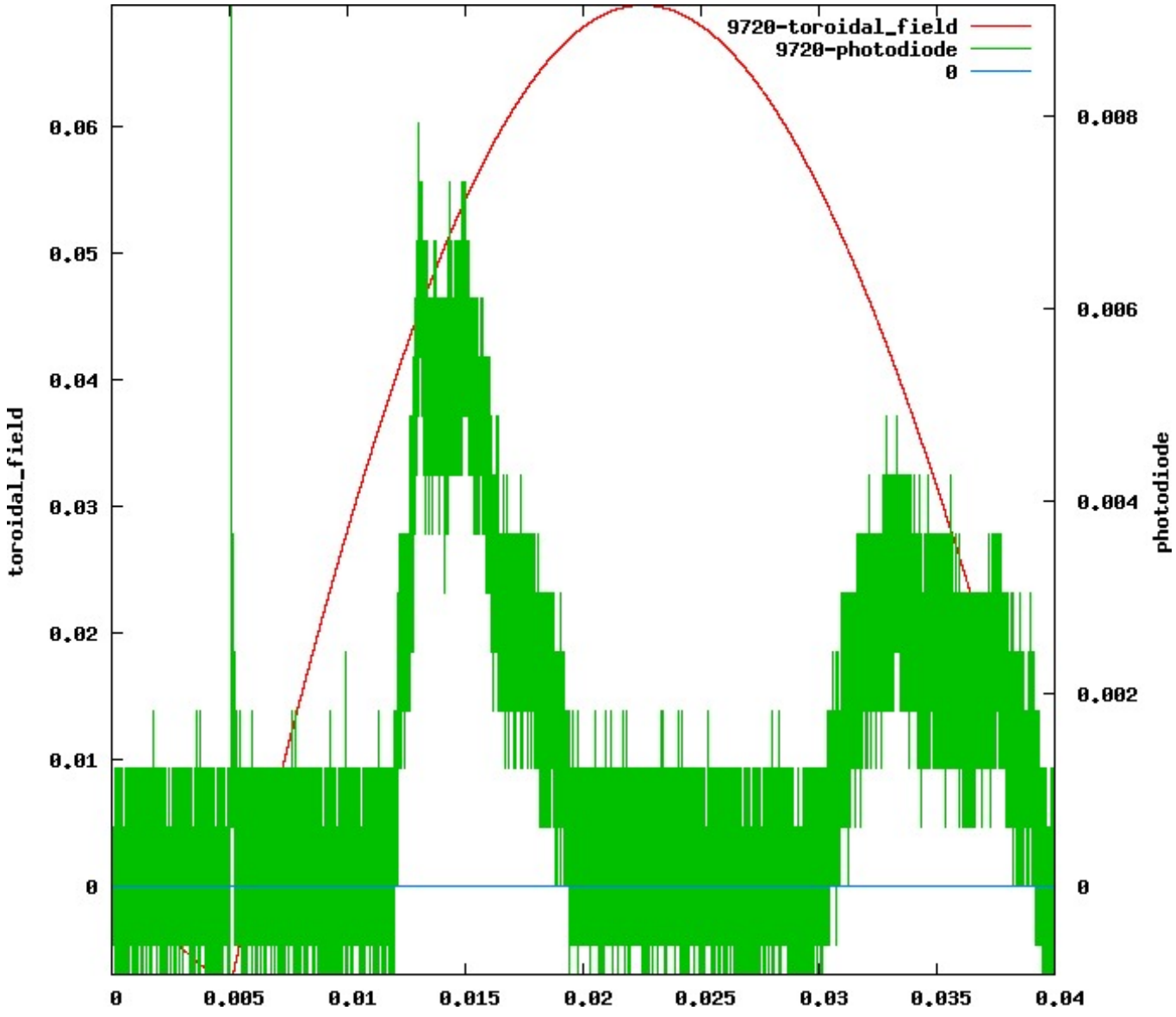
Experimental Setup



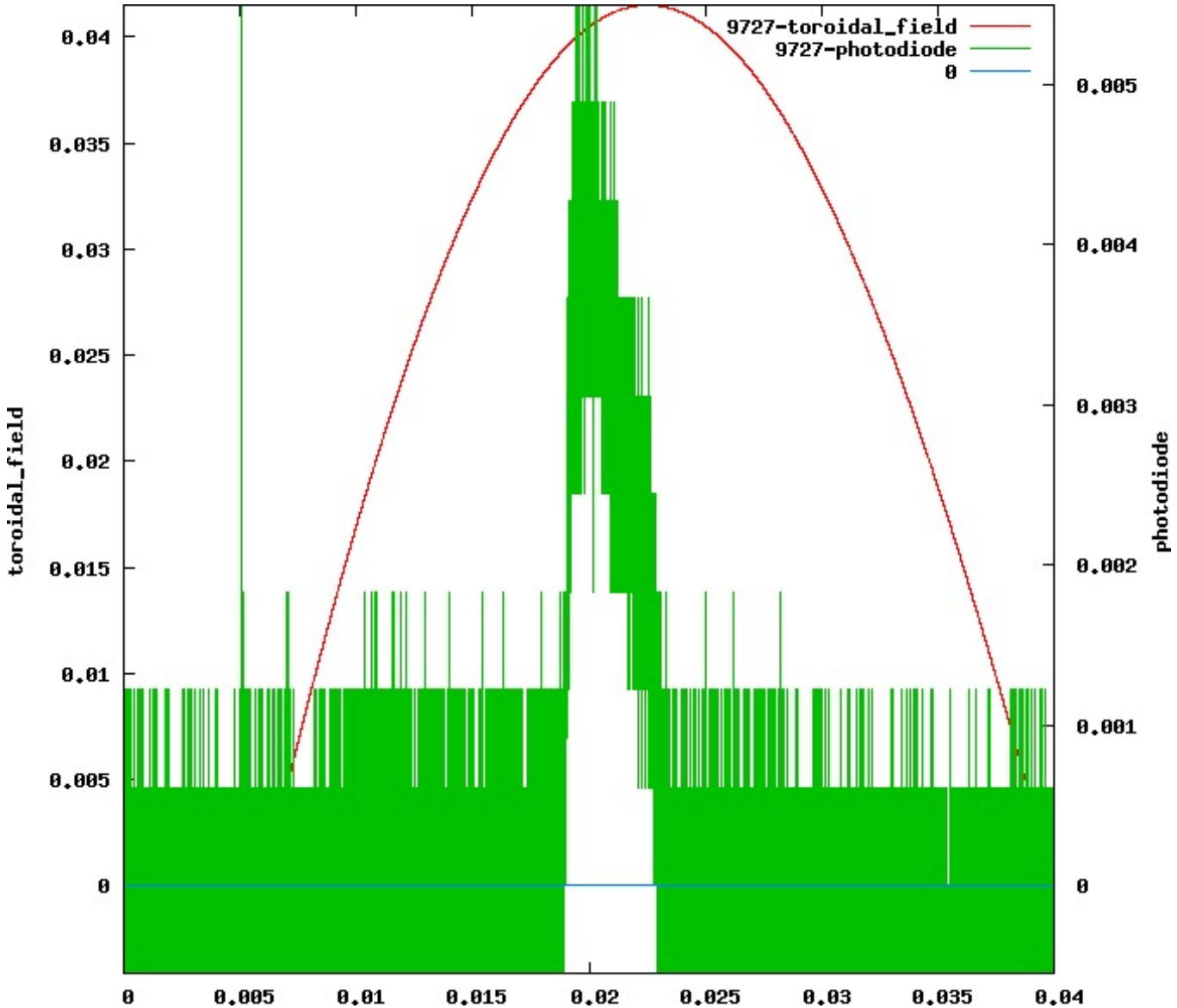
Results (B_t & H_2) ... one hit



Results (B_t & H_2) ... double



Results (B_t & H_2 & E_t) ... no flux



Content

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