ASD Scorpius

Ground Loop Correction + Pulser Waveforms

Ivan Aponte

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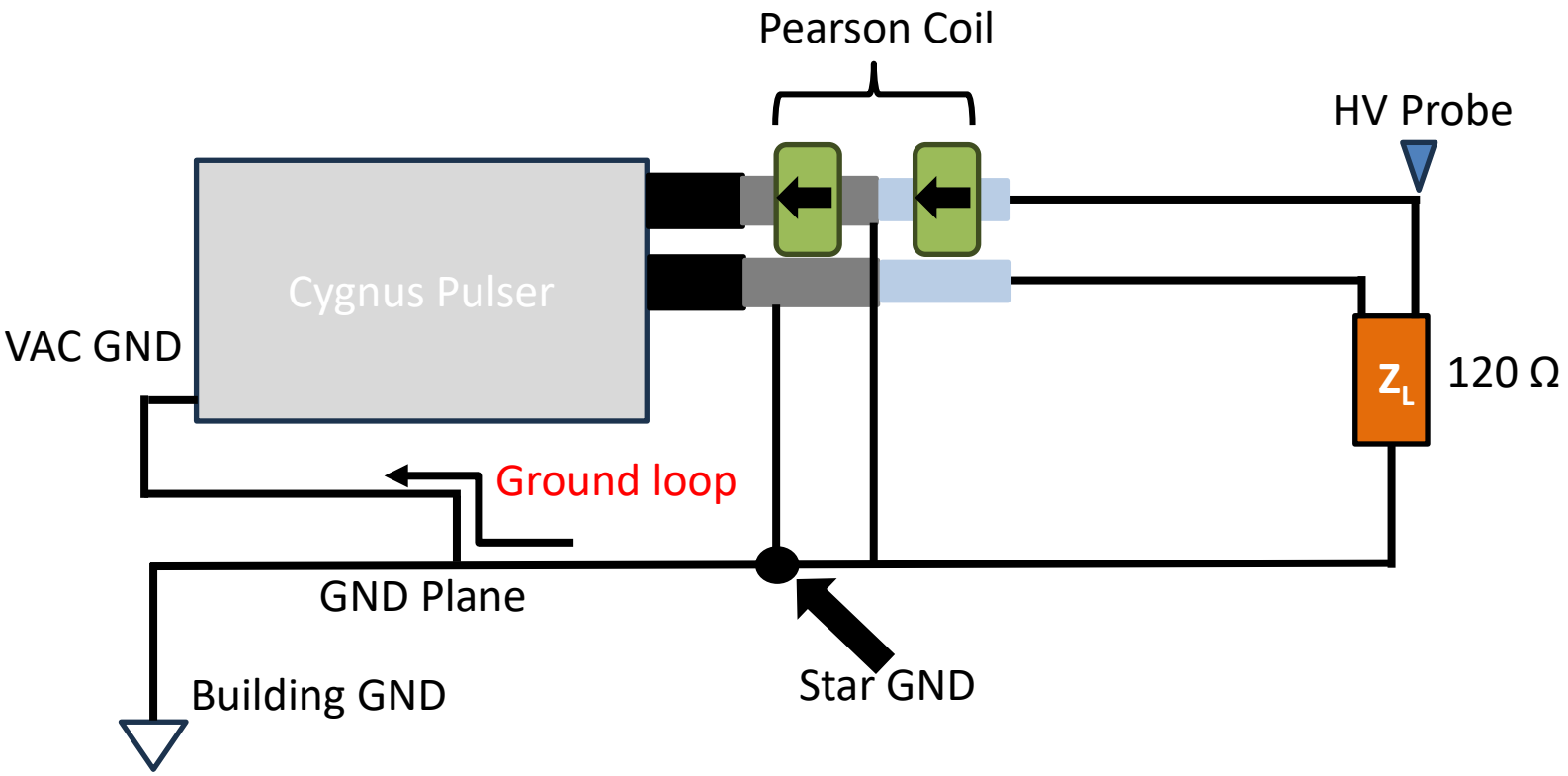
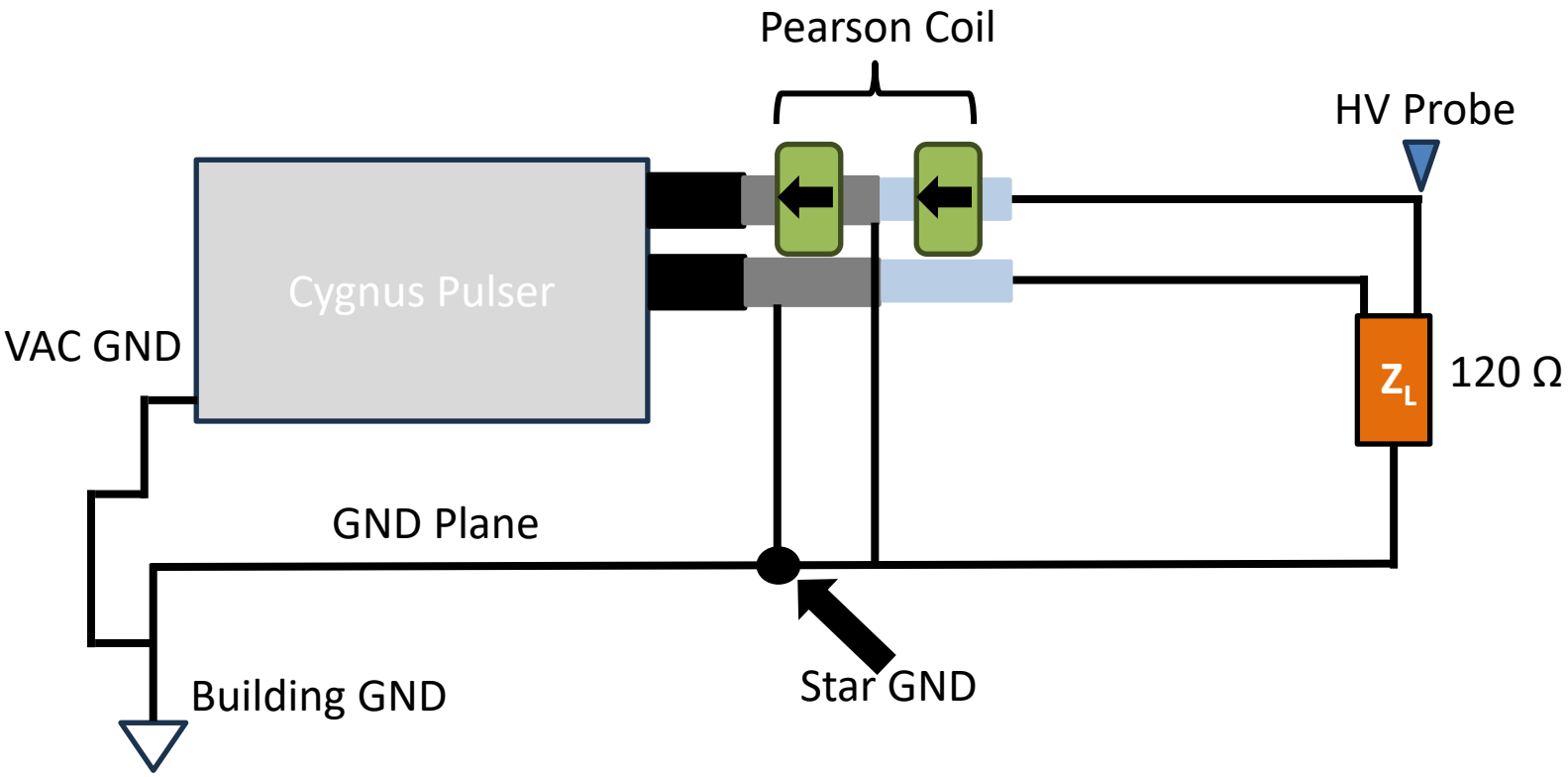
Resolving the Ground Loop



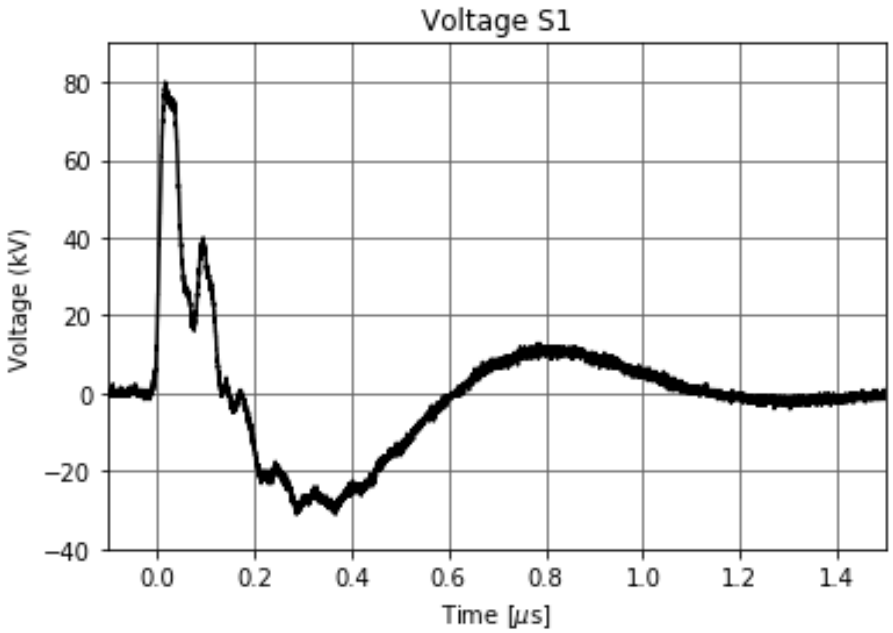
- Ground loop present due to VAC power connection
  - The plug that was used had a direct connection to the ground plane
  - Current looped back into the pulser instead of the building ground
- VAC power cable moved to a plug that is connected to a breaker, this fixed the issue

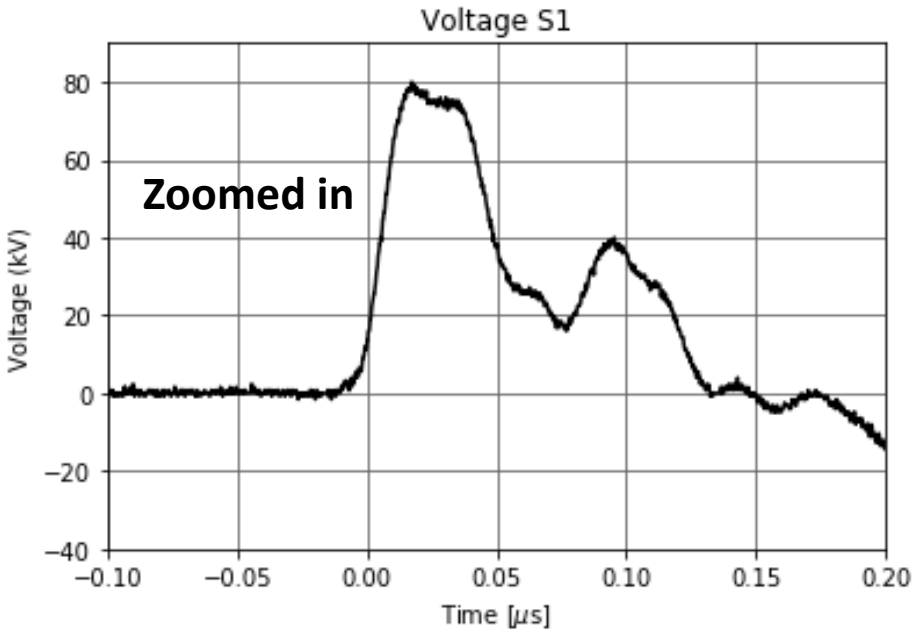
Experimental Setup



- Current measurements made on shielded and unshielded portion of coax
- Voltage measured at the load
- Purpose is to get a quick look at the degree of attenuation and distortion present on the measured current waveform leaking from the shielded section of the HV coax

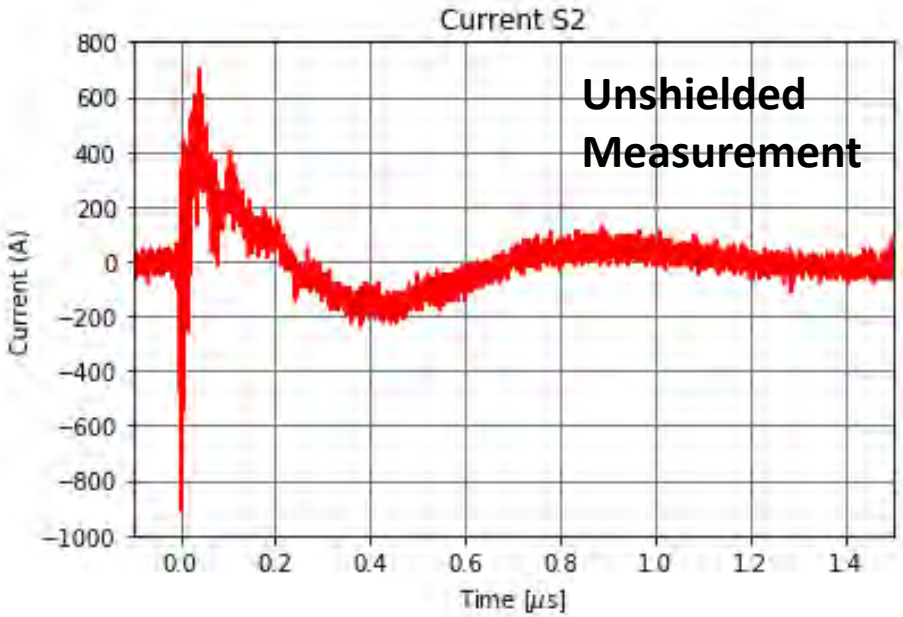
Voltage Waveform

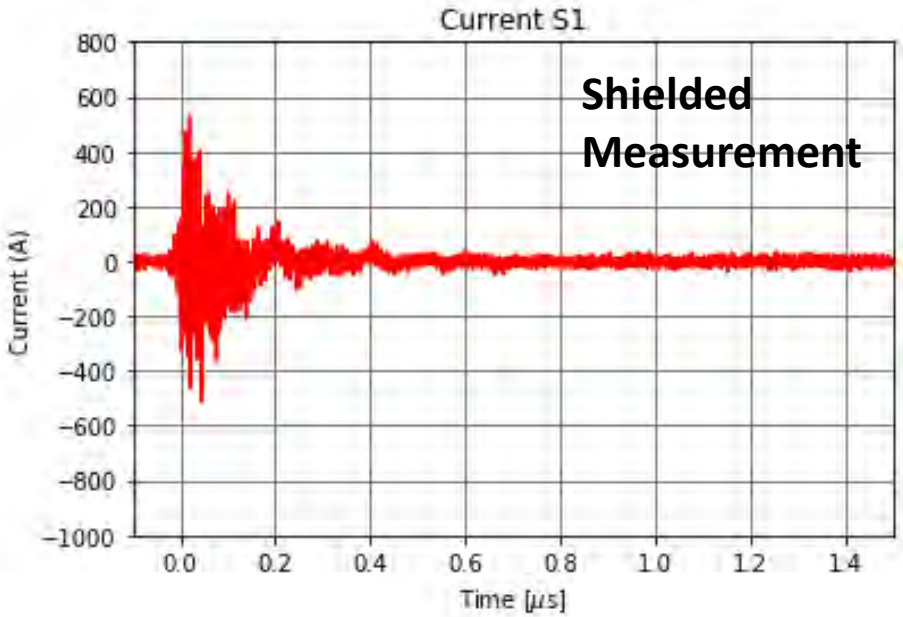




- Approx. 80 kV peak, 45 ns pulse wide, ~20 ns rise time
- Looks much cleaner than waveforms produced by earlier pulser
- No distinguishing waveform features that draw concern

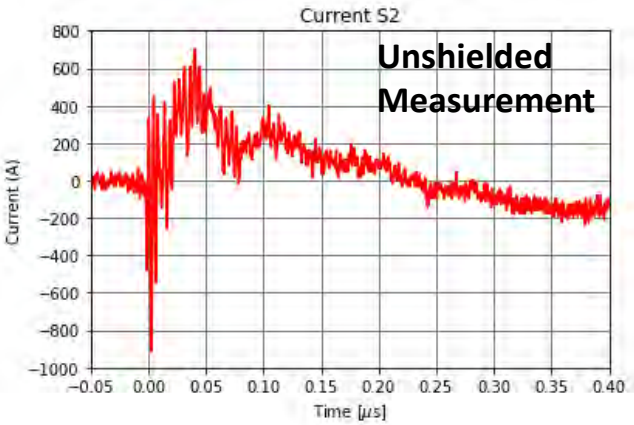
Current Waveforms

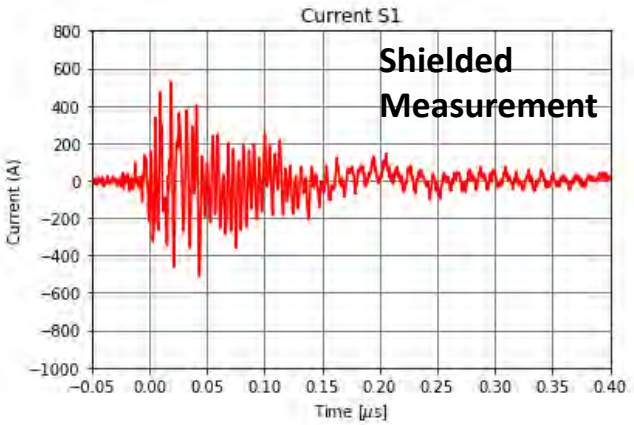


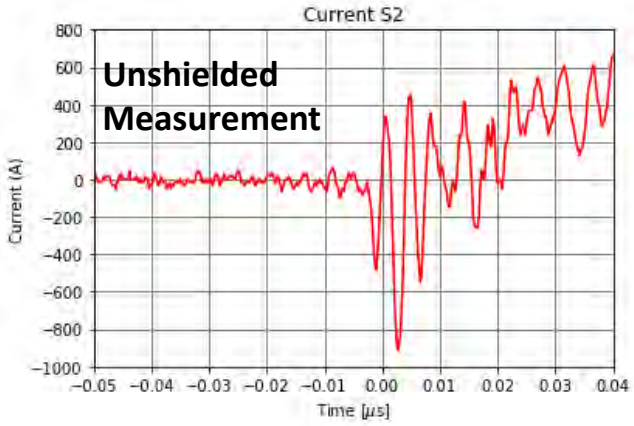


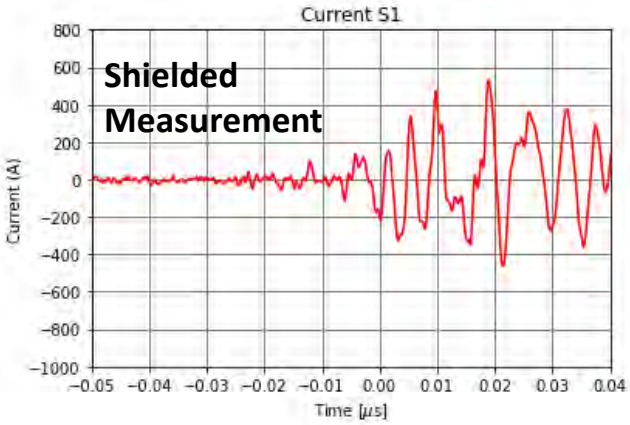
- **Unshielded**
  - Peak current reaching past 700 A
  - Big negative spike at the beginning of the waveform (zoomed in waveforms in next slide
  - Soft back swing (starting at ~0.2 µs) around -200 A, lasts for 0.5 µs
- **Shielded**
  - Peak current ~500 A
  - Soft back swing not present here

Current Waveforms (Zoomed In)









- **Unshielded**
  - Some noise riding on the current waveform
    - Possibly due to proximity of second HV cable to the Pearson coil
- **Shielded**
  - A lot of signal coupled out, but unshielded waveform not discernable here
  - Frequency content between unshielded and shielded waveforms are similar

Next Steps

- Apply post-processing to shielded waveform (filtering, integration), see how much of the unshielded waveform can be brought back
- Experimental measurements with prototype diagnostic
  - Using Rogowski coil, measuring on unshielded and shielded portions of the HV coax cable
  - Comparing measurements with Pearson coil
  - Use 120 Ω and 0.1 Ω (high current case) loads
  - Post-process of collected data, determine the feasibility of non-intrusive approach for