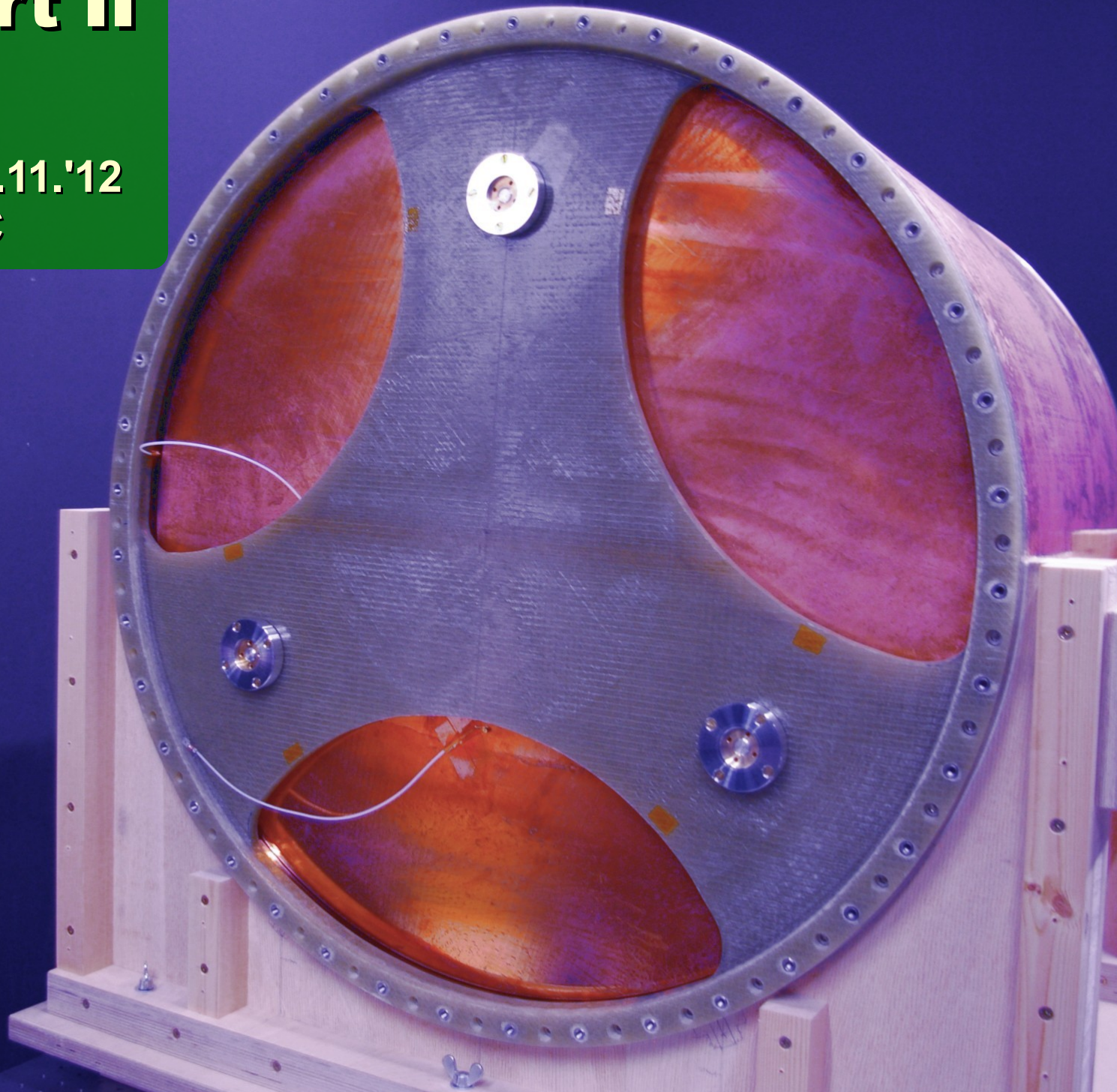


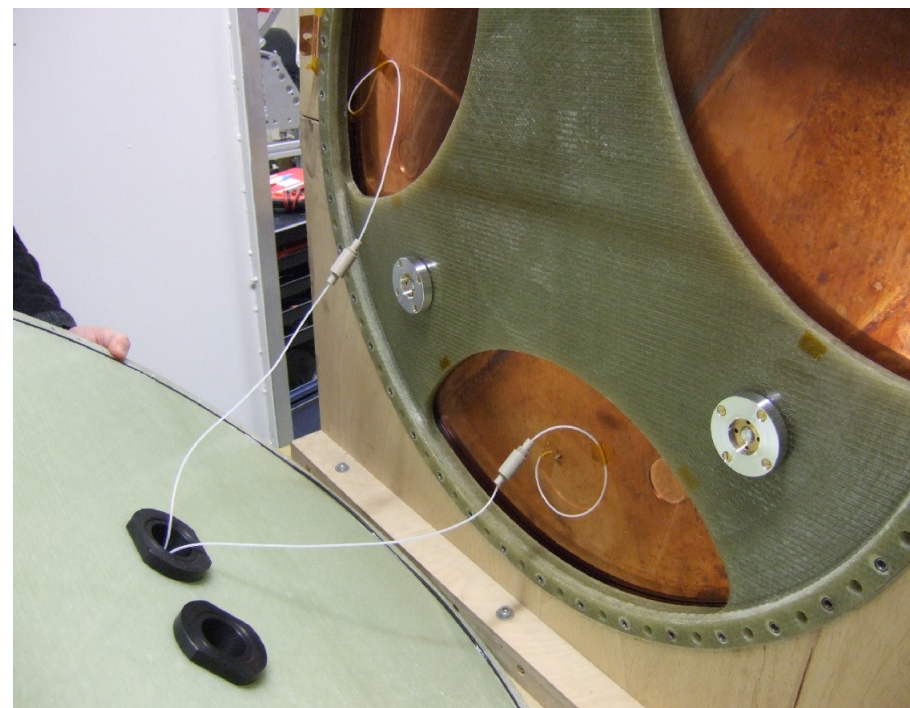
LP HV / Part II

Destroying and Fixing the
Cathode Side HV Connections

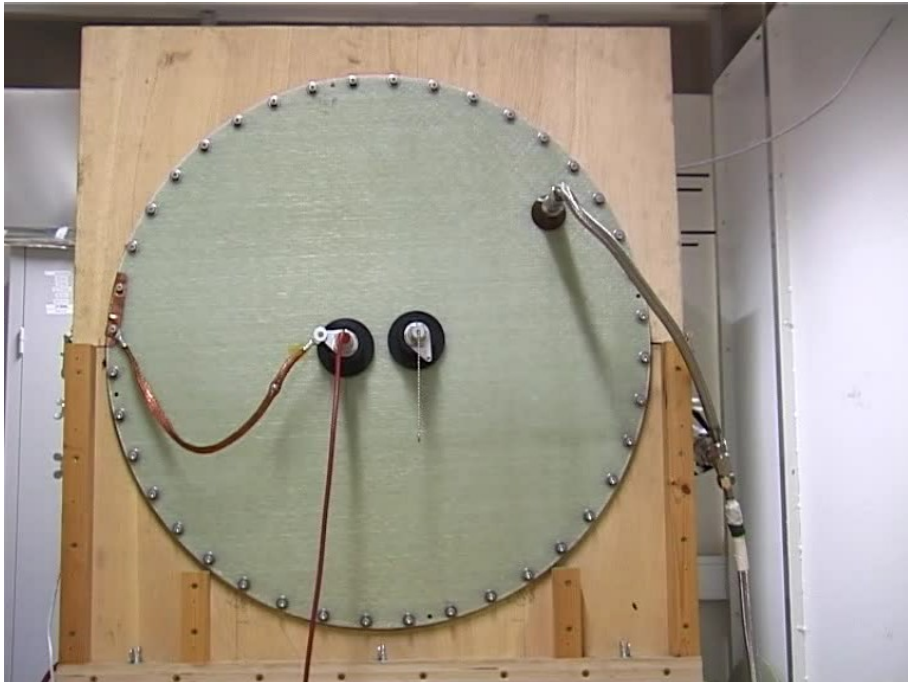
WP Meeting 163, 22.11.'12
R. Diener / FLC-TPC



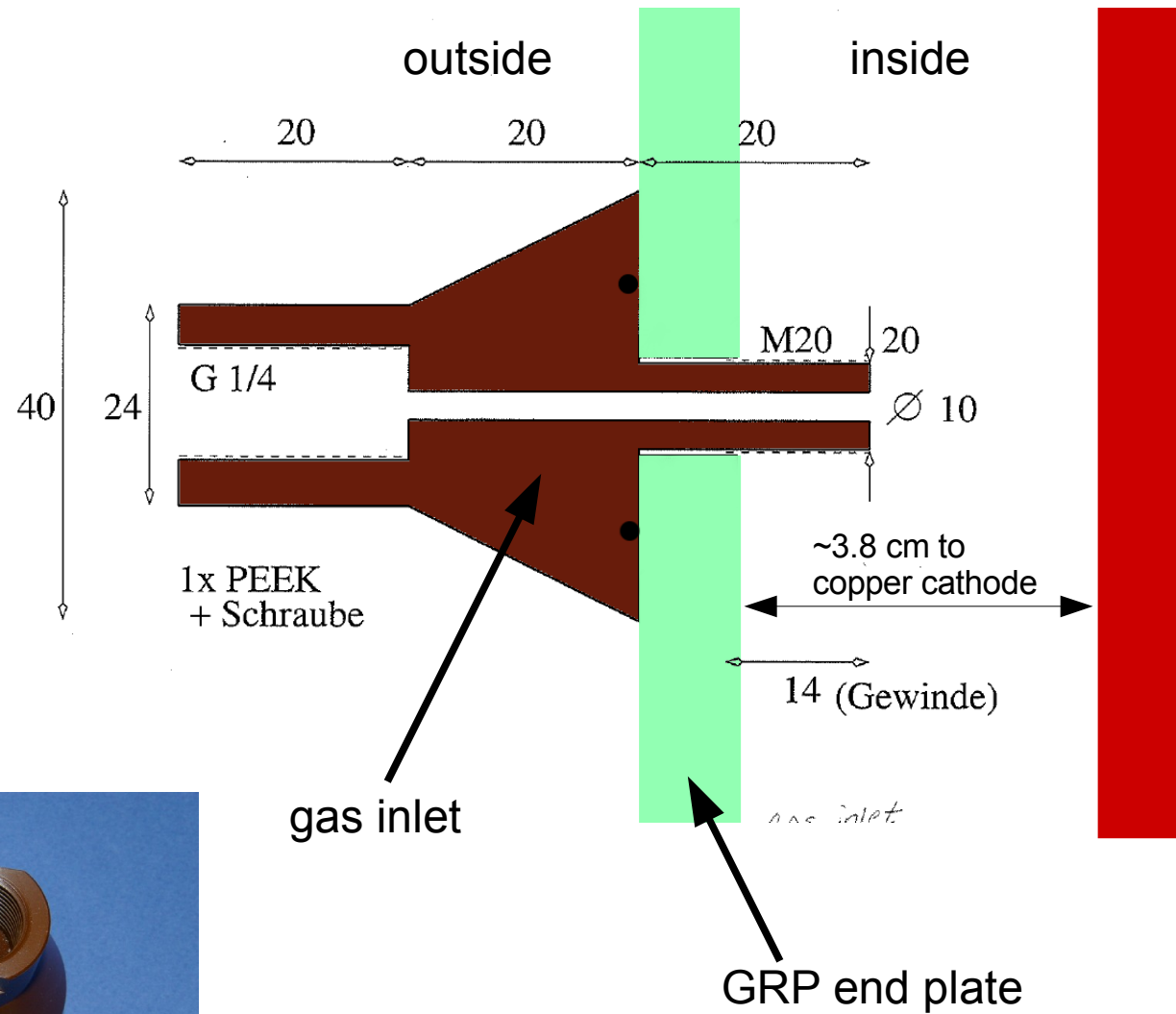
- Beginning of 2012:
 - Additional insulation on the cables at the cathode side to make field cage stand more than 16-17KV (discharge light seen in tests before)
- Before and during DESY GEM module test beam:
 - Many repairs and fixes beginning of September 2012 for the HV connections on the anode side
 - See talk from WP Meeting 158:
<https://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=5822>
- 23. Sept. 2012:
 - During DESY test beam Large Prototype HV tripped again, this time at the cathode side
 - Test beam continued with lower drift voltage (15.5kV before, 10kV after)



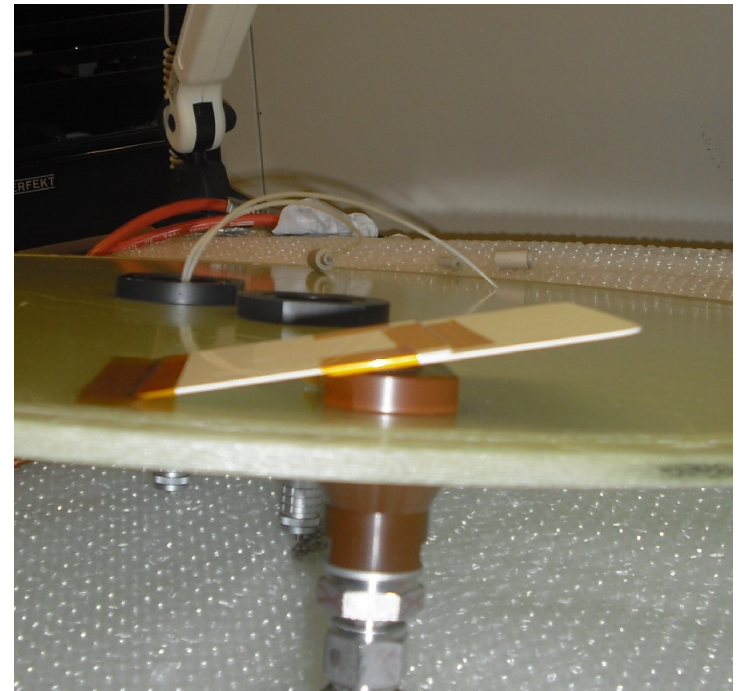
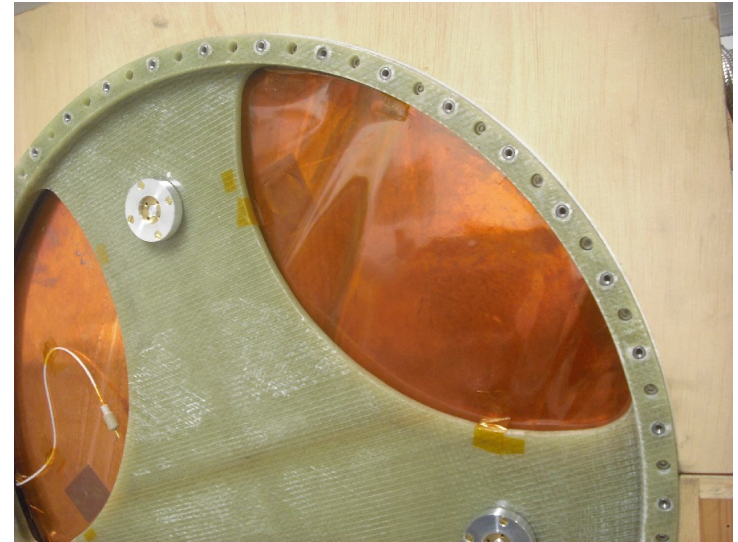
- Test of HV delayed after test beam in September: both CAEN multi-channel power supplies broke and had to be repaired
- After this, we set up everything in our lab as it has been at the test beam
 - Surprisingly we could ramp up the cathode higher than 10kV again
 - But it was still not stable
- With a video camera we were able to see the location of the discharge: the gas inlet
(test at 2250V at anode side and 18kV at cathode side)



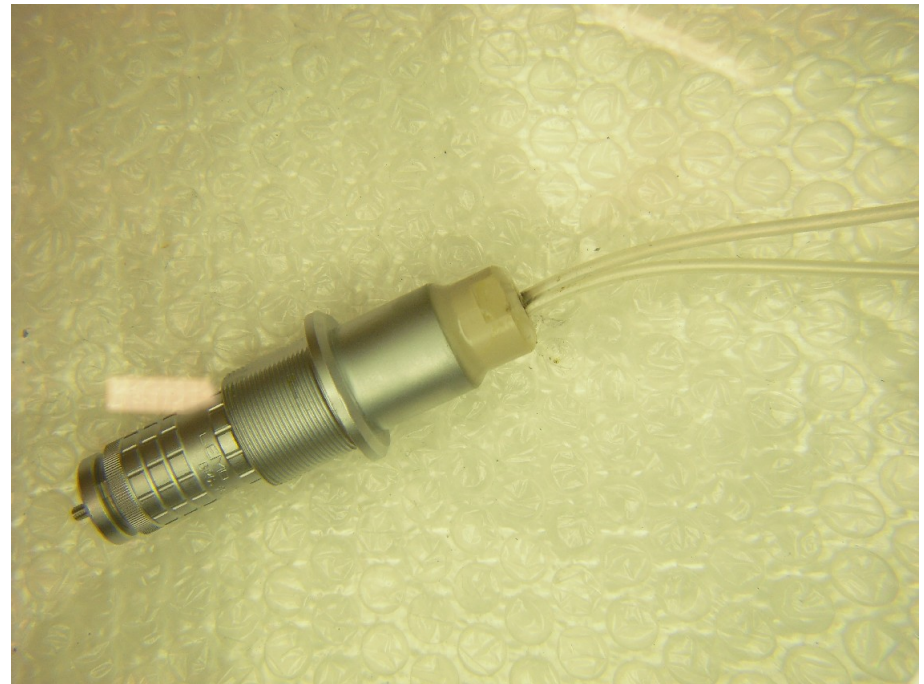
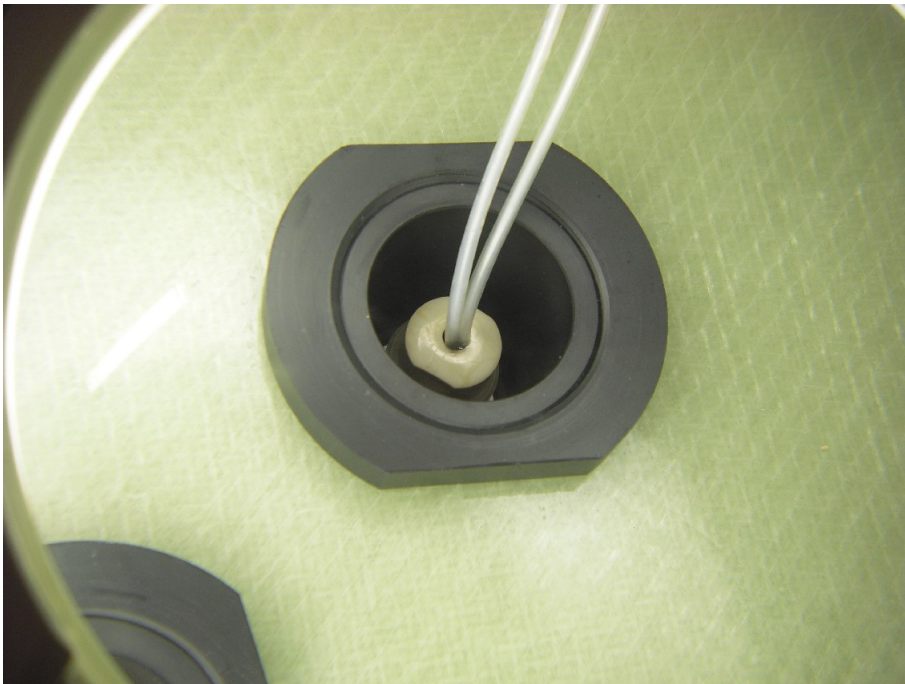
- Gas inlet:
 - Made from Vespel
 - Distance of gas line (metal) to copper plate of the cathode theoretically enough to avoid sparks in Argon



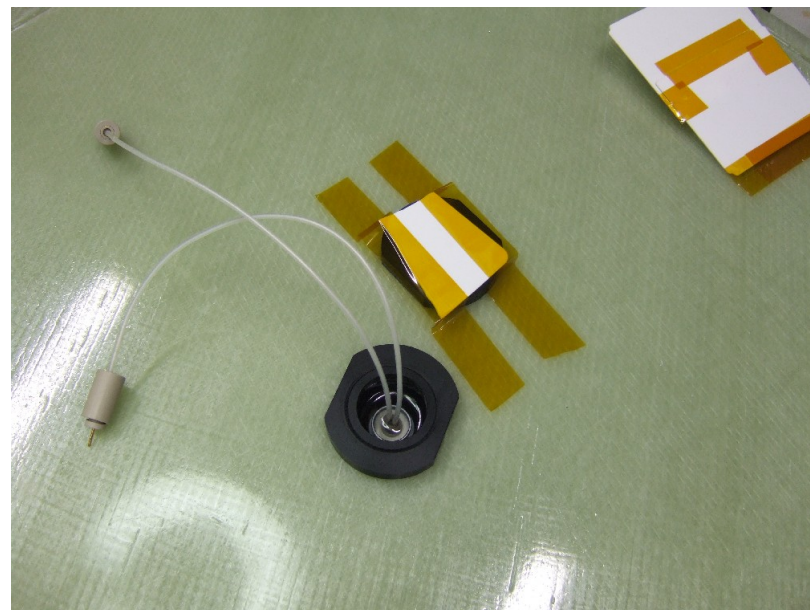
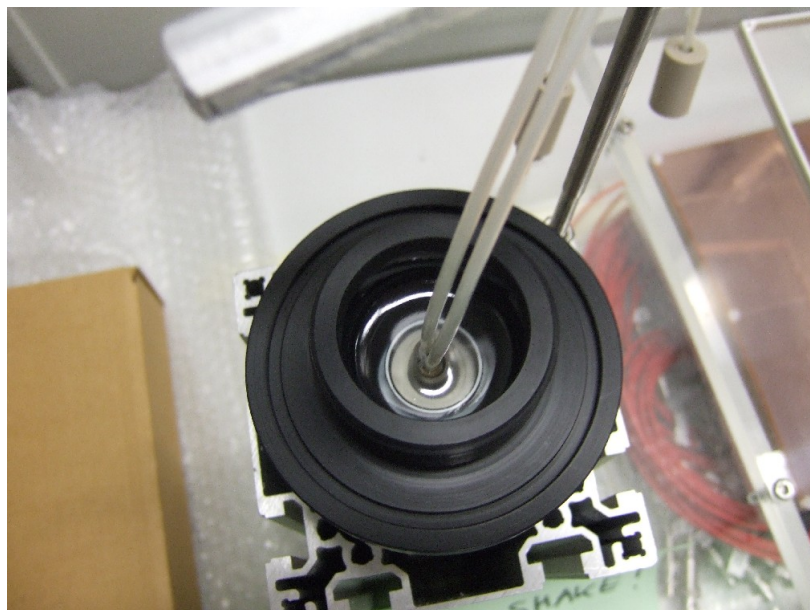
- Make the insulation better at gas inlet
- All modifications still improvised to test reliability before installing permanently
 - Kapton foil over copper plate of cathode
- Ceramics plate over inlet
- Will be re-done properly after the current test beam effort!



- First, the test with the modification ran stable but tripped after ~20h
- After this, field cage tripped immediately at ~10kV (carbon bridge?!)
- Open the cathode end plate again:
 - Carbon Bridge in the HV plug, why now and not before is unclear
 - Plug casted in Stycast, not possible to open/repair it without destroying it



- Fortunately, two plugs are build in the end plate, so we had one spare
- Casted the whole housing with the soldered cables up to and over the shrinking tube with Stycast
 - Pumped two times (after mixing and after casting) in vacuum tube to make sure no air bubbles remained
- Covered old, broken HV plug with ceramics plate (also improvised, as before)



- After flushing the field cage with Argon it stood 17kV (2250V at anode side) over more than 24h without problems
 - After ~24h we stopped test to bring field cage to test beam
- Tests with higher voltages postponed no to risk any delays for the current Asian test beam

- Next steps (LP HV wise) after test beam effort
 - Make a new gas inlet with a 90 degree bend and a cover towards the cathode copper plate
 - Attach Kapton foil to copper end plate more properly
 - Replace broken HV plug with a new one
 - Long term: cathode plate of composite material with aluminum/copper layer:
 - Better insulation towards the GRP plate and less weight
 - Combine this with new mounting system for end plate