Scintillators: Setup, performance and lessons learned

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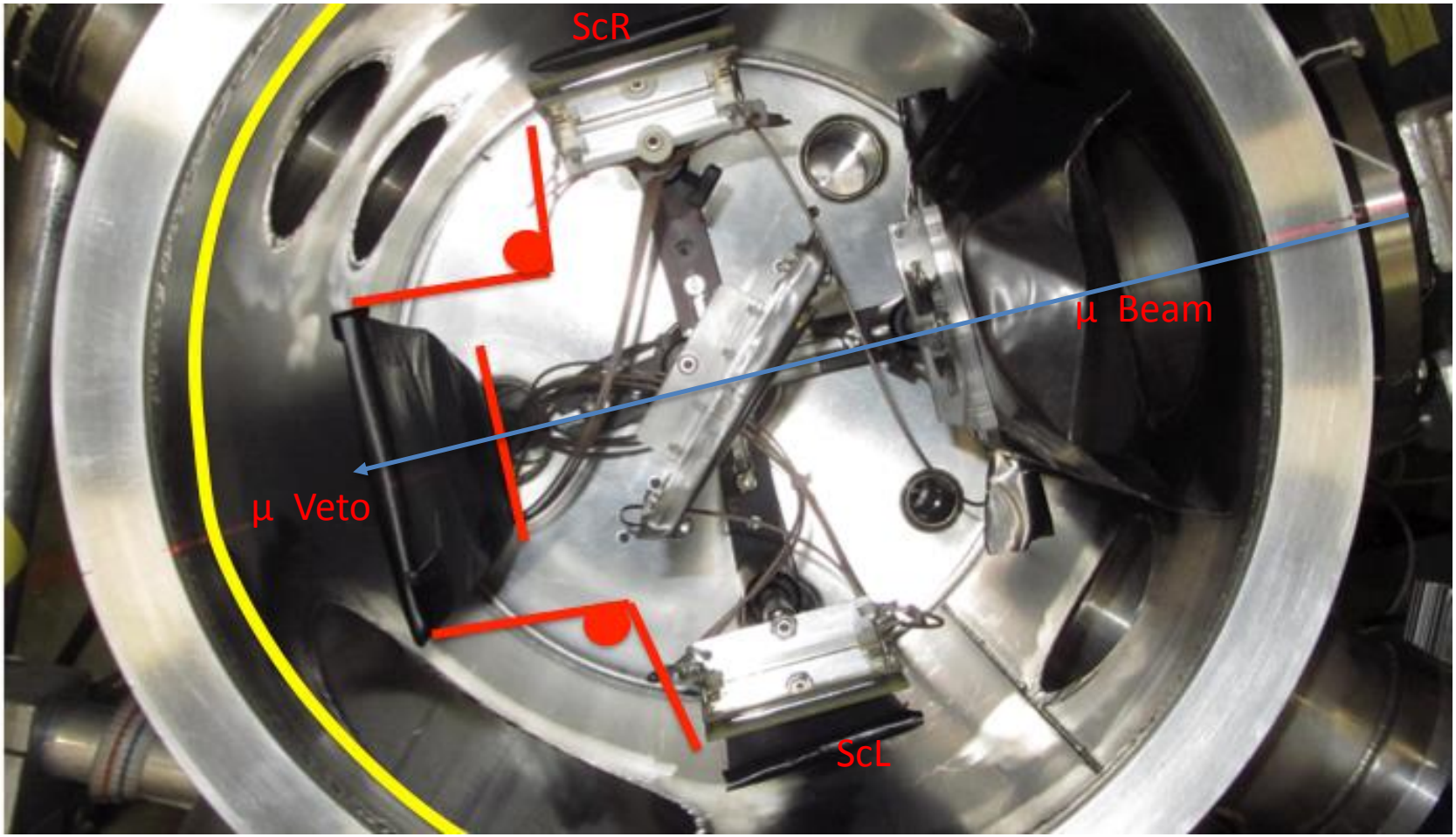
- Scintillator/Light-guide Setup
- PMT Setup
- Signal reading

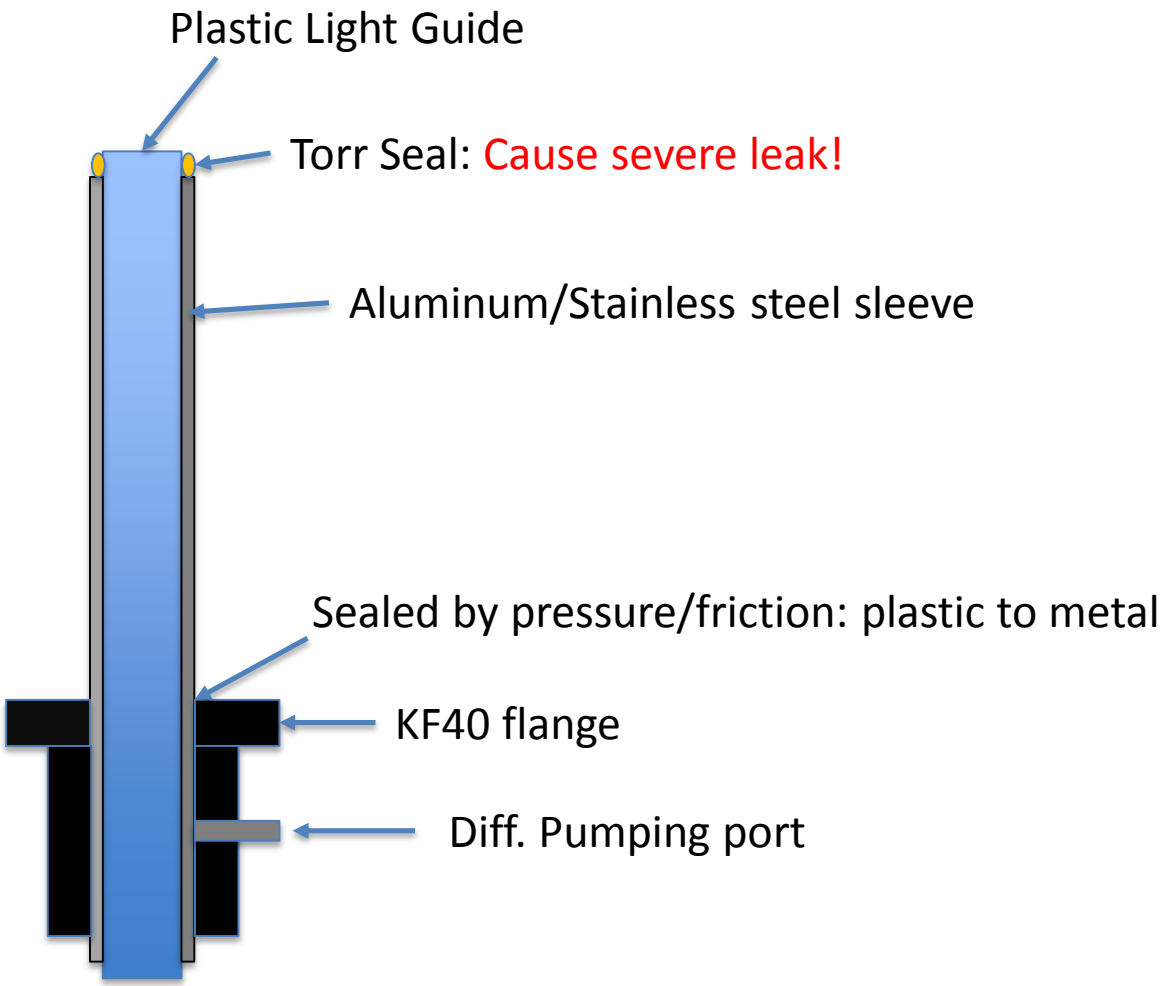
Scintillator Setup



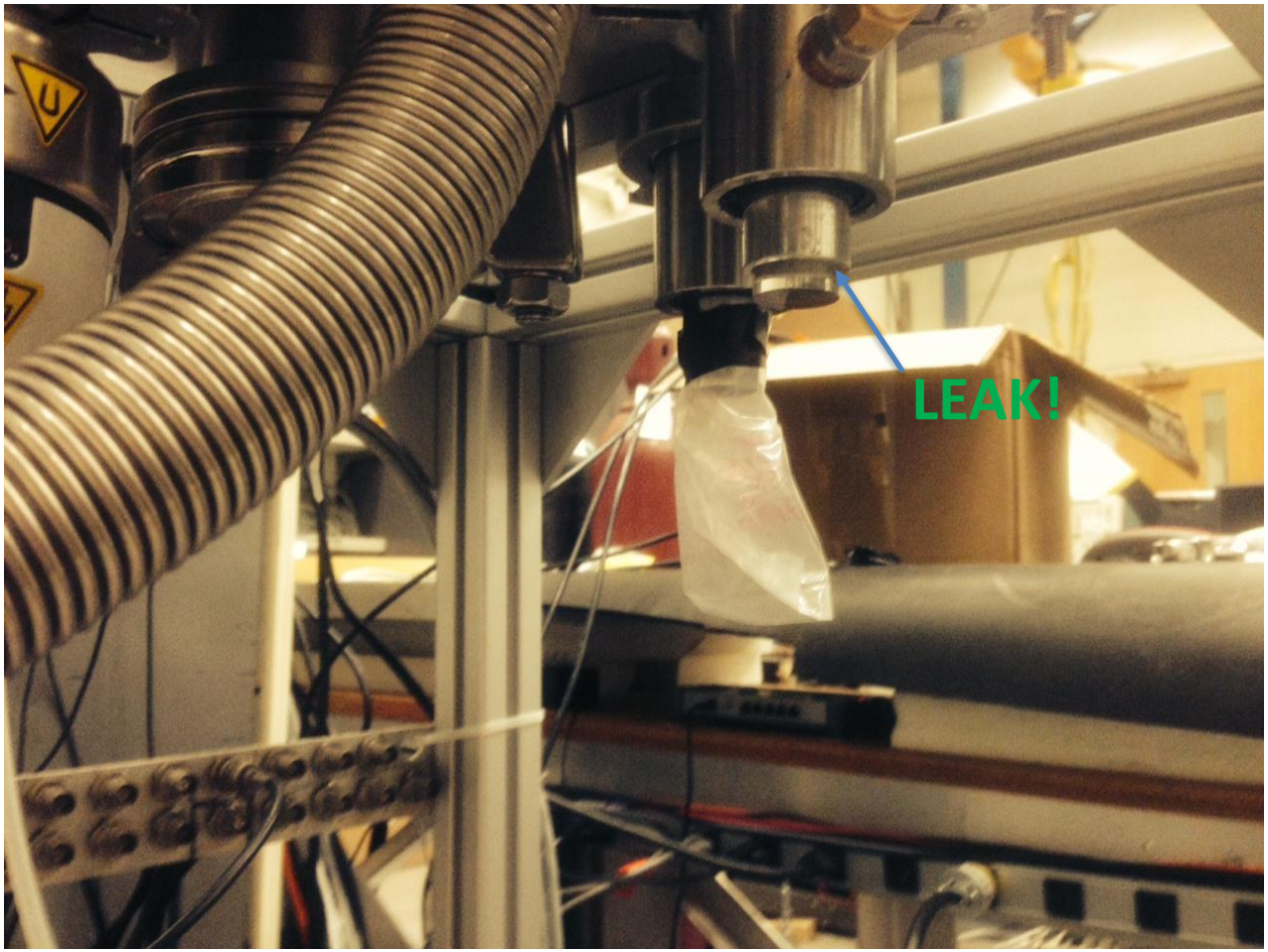
Scintillator Setup

- Easy to change Scintillator angle, but hard to change it’s height, impossible to change its horizontal position
- Tiny shift between ScL and SiL
- Very hard to mount the light guides after the scintillators are glued on

Light guide configuration



Light guide leak



Fix the leak

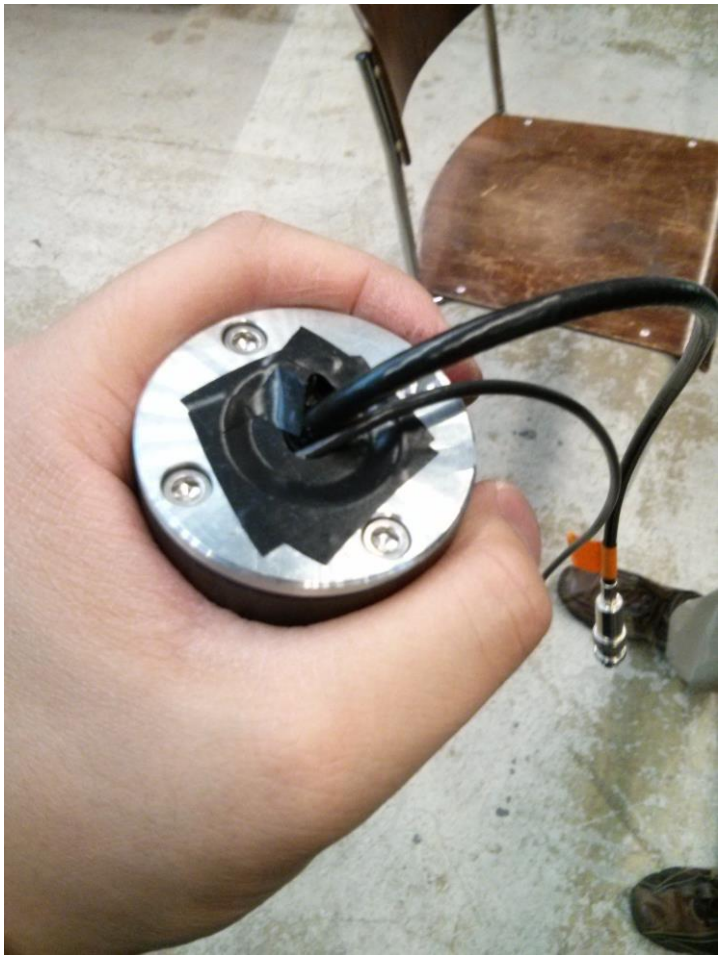

Newest Torr-seal, leaks most
UHV sealant does not help


Easy Fix: Covering with excessive
UV cured optical glue

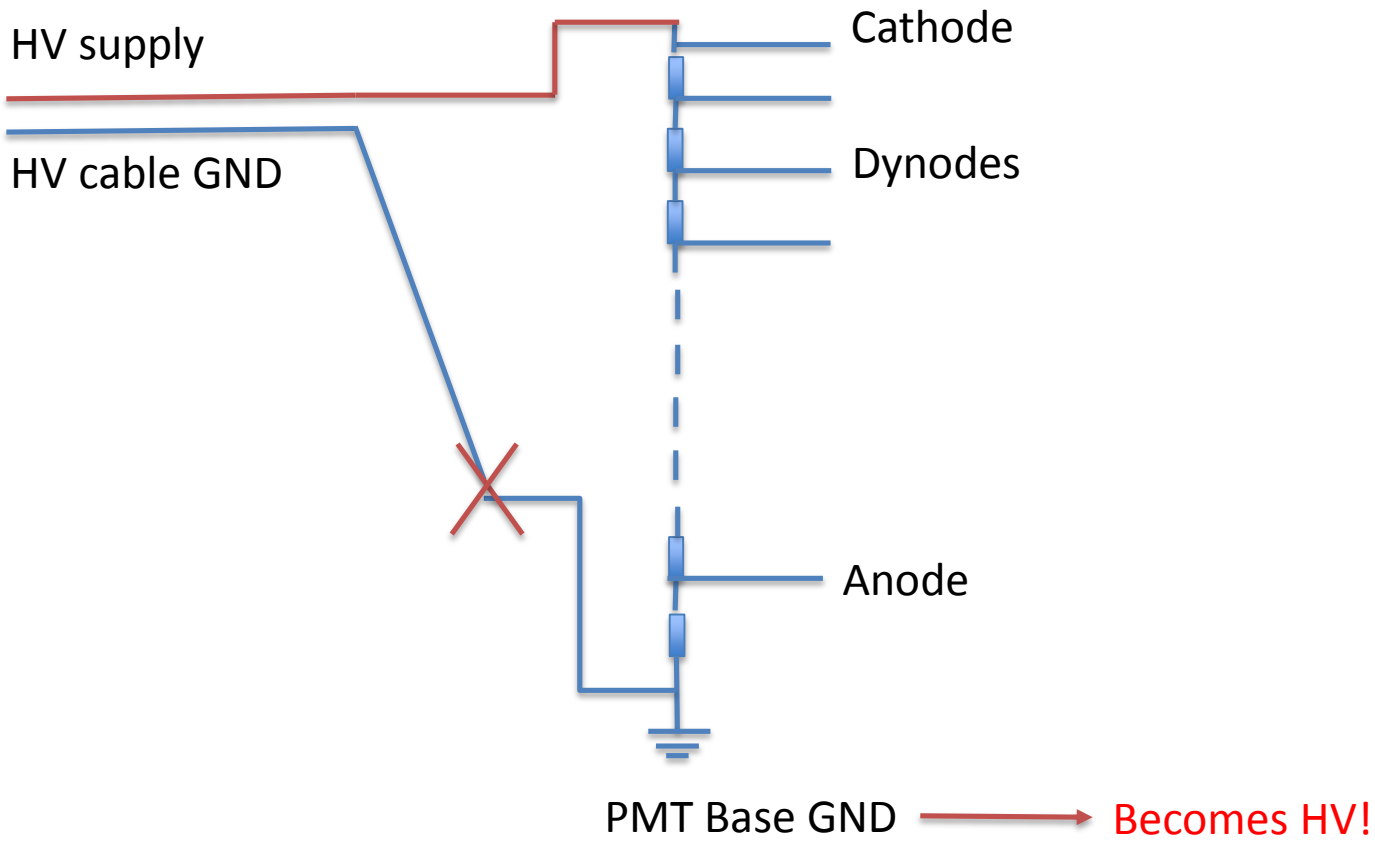
PMT

- PMT Module: XP2982 (datasheet elog:490)
- Bias: -1800V (see elog:507)
- 2 PMT bases broke, 1 person shocked!
  - ScR first, then Mu-Veto

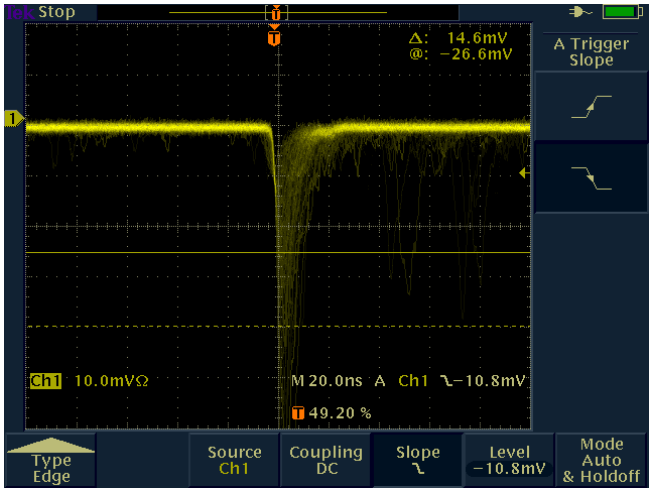
PMT Base Problem



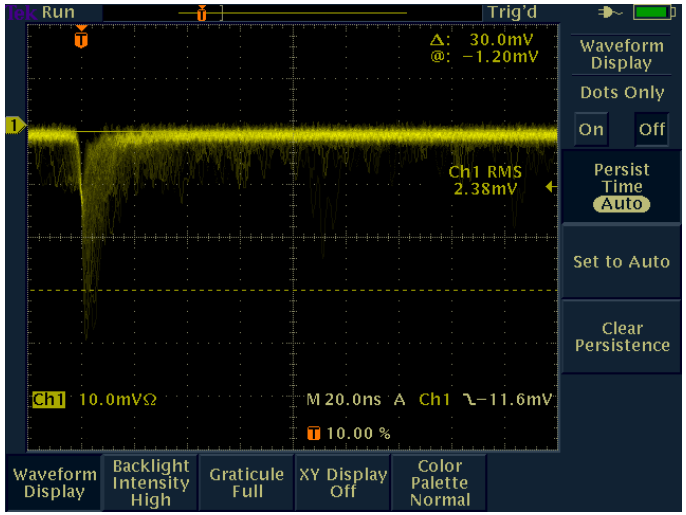
Why shocked?


HV supply
HV cable GND
Cathode
Dynodes
Anode
PMT Base GND
Becomes HV!

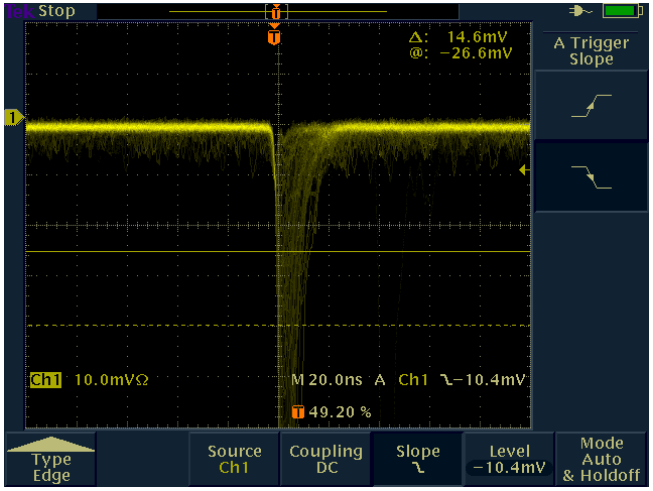
Signal of ScL/ScR/MuVeto



ScL



MuVeto

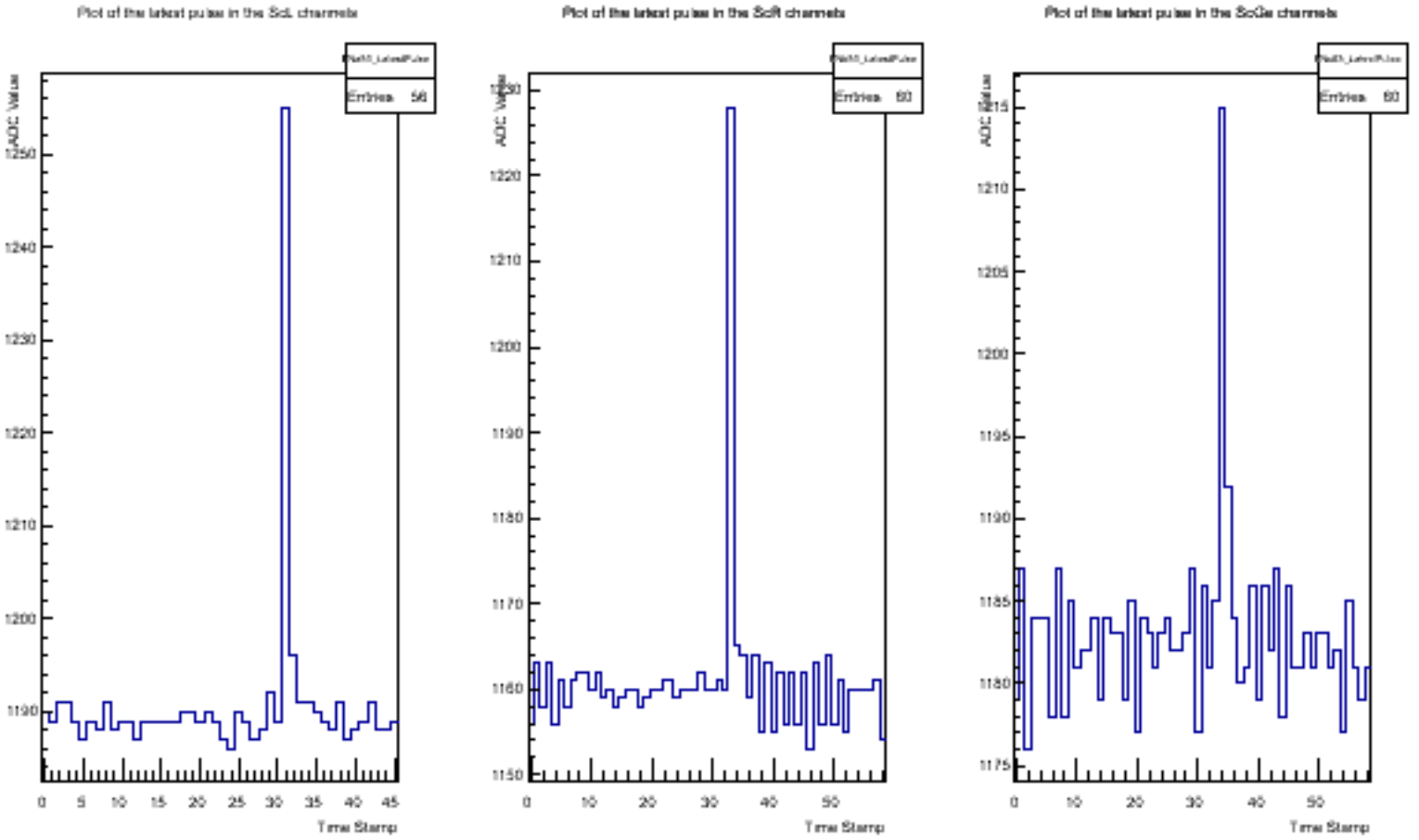


ScR

Pictures are from elog:475

ScL may be broken (elog:440)

Signal of ScL/ScR/MuVeto



Pulse shapes using FADC, elog:513,535

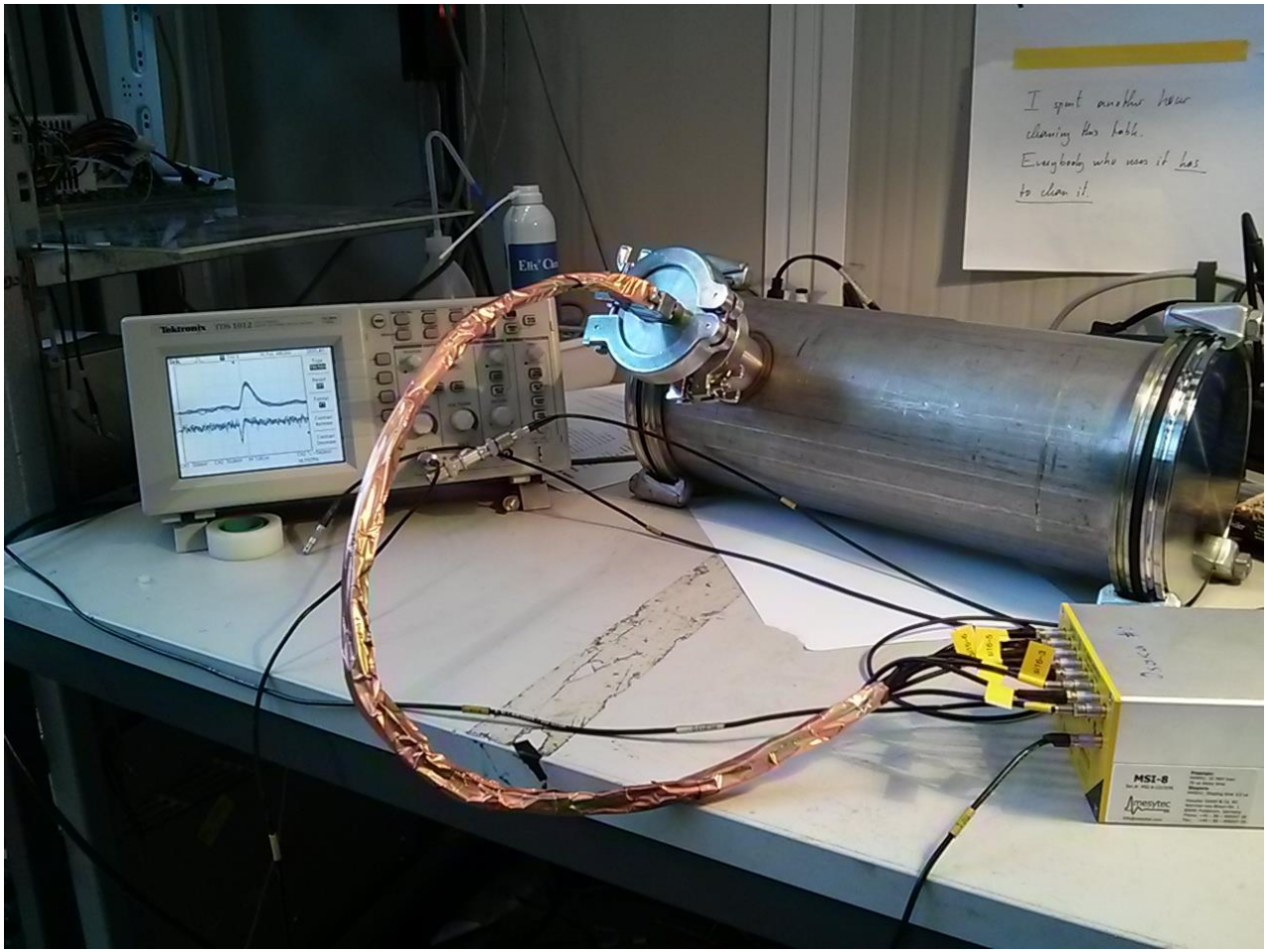
Signal of ScL/ScR/MuVeto

- Using BU digitizer to read the Scintillators (elog:539)
  - Ch0: muSC
  - Ch1: ScL
  - Ch2: ScR
  - Ch3: muVeto
- For analysis: see whether we have good energy resolutions / good pulse shapes.

Lessons learned

- The seal between the light guide and its sleeve is flaky, the KF feed-throughs are OK.
- PMT bases are fragile, need more careful handling. Check connections before biasing. Need more spare ones (or more robust ones).
- FADC sample rate is not high enough for PMTs, need shaping amplifiers or faster digitizers. Analysis group should pay attention to the pulse shapes of the PMTs.

Bonus: Si16


I spent another hour
cleaning this table.
Everybody who uses it has
to clean it.
Tektronix
MSI-8

Bonus: Si16

- Cover the bunch of cables with copper tape
- Braids of the cables are isolated from the connector
- Tricky to get rid of noise/ground loop (elog:599)
- Achieved resolution using 1MeV pulser: 100 keV

- Not be able to use Am241 to calibrate: The air attenuate the alpha particles too much (elog:607)