Results from LUX Surface Run

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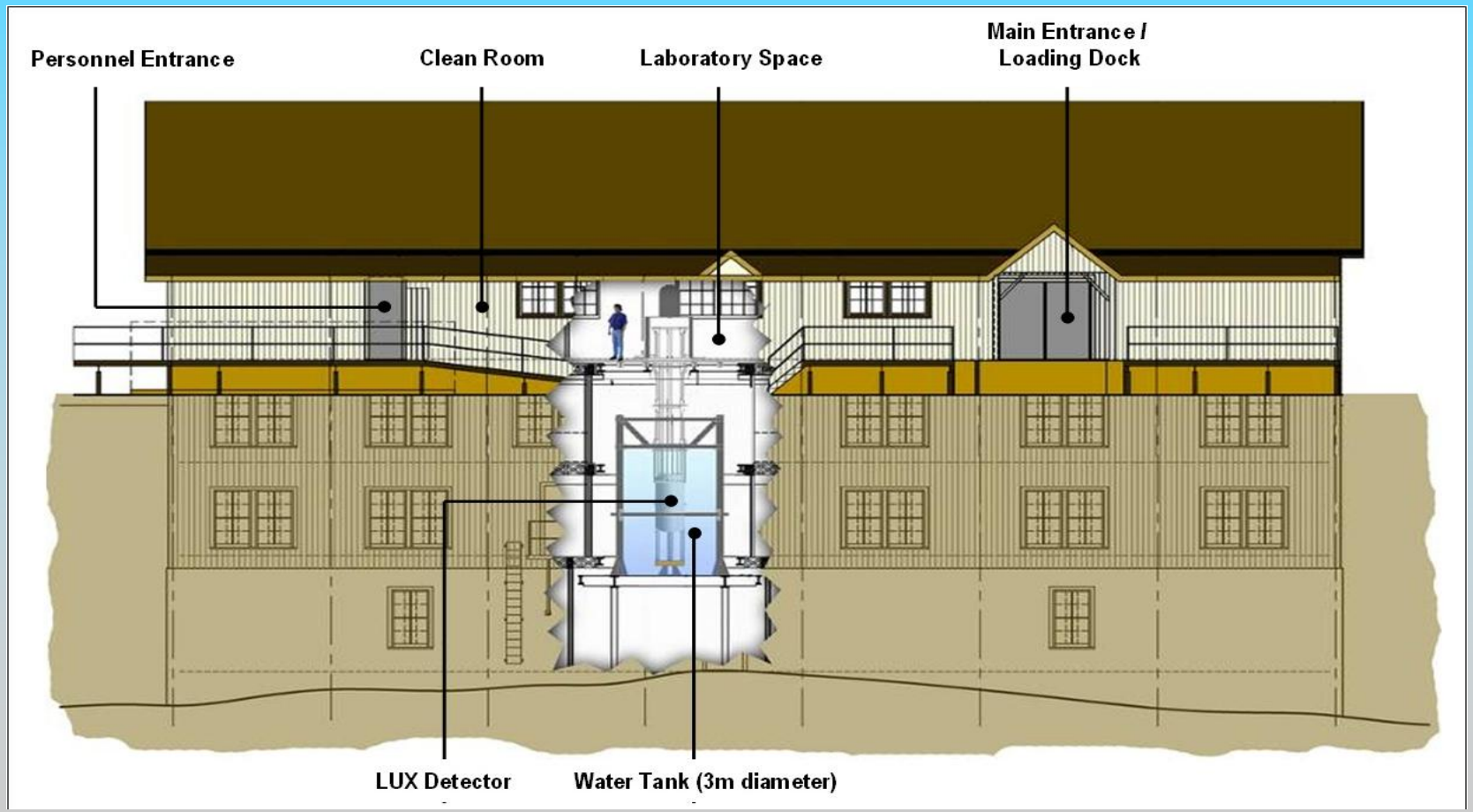
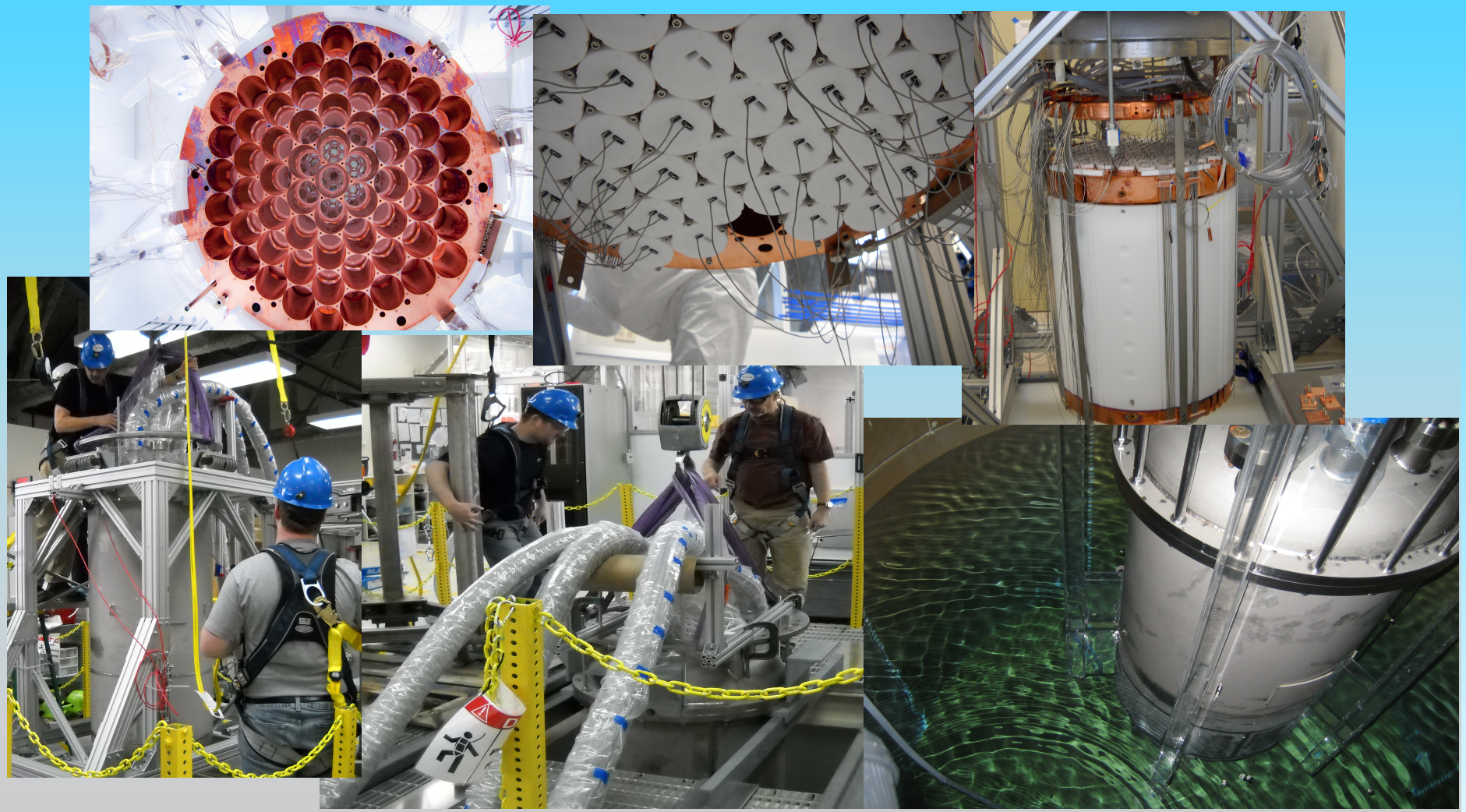
Jornadas LIP 2012 - Lisboa

Surface Run: Nov. 2011 → Feb. 2012

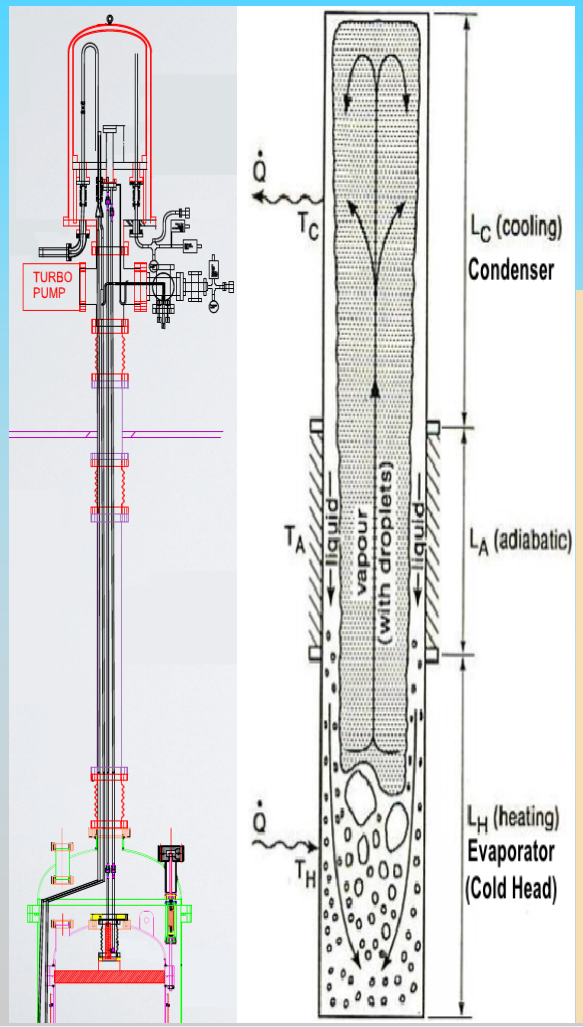
Test everything (as extensively as possible) before Underground deployment.



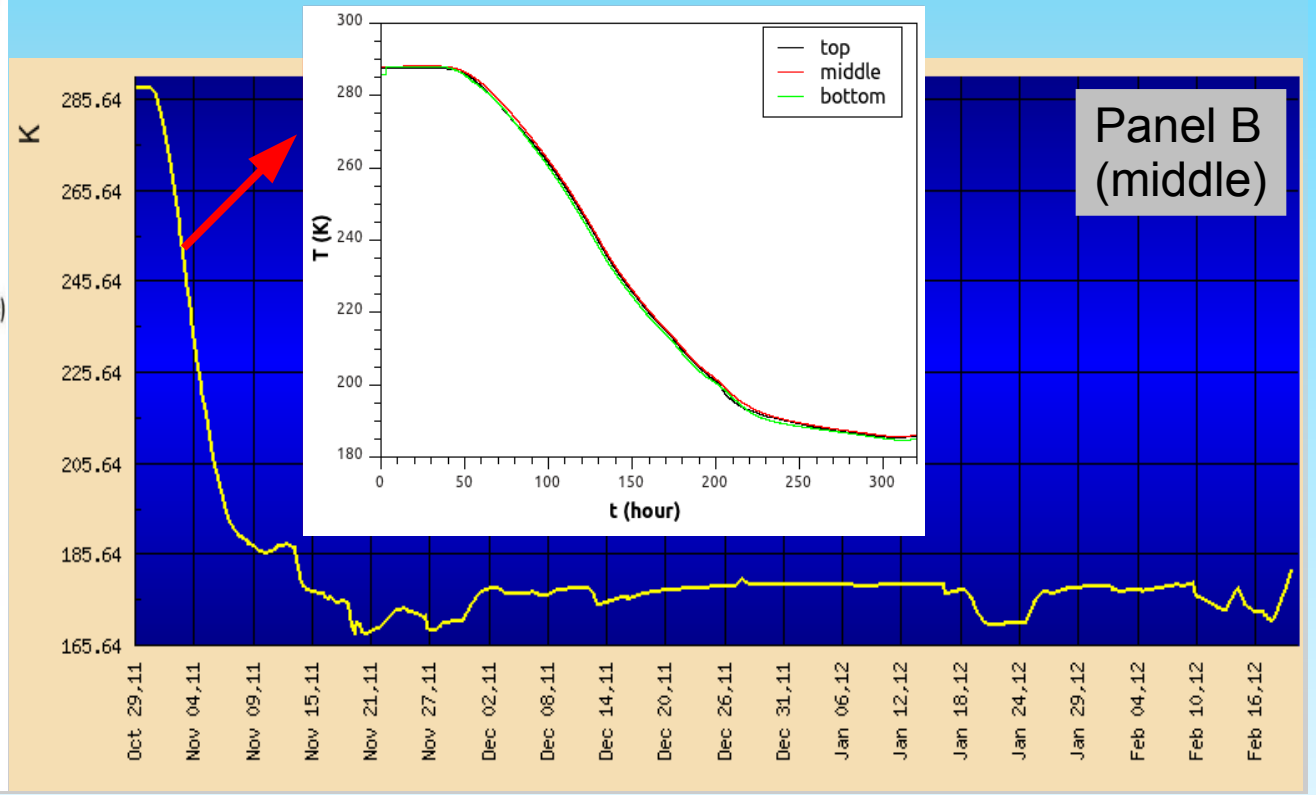
Surface detector deployment



Cooling System – Thermosyphon



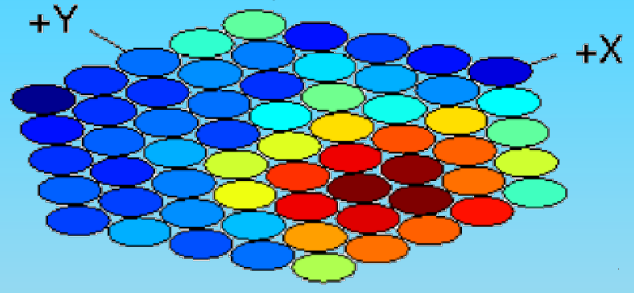
- ~kW capacity / multiple cold head deployment;
- Circulate Xe through getter: 0.3t Xe/day @ 35 slpm;
  - Heat exchanger eff. > 98% (<5W heat load);
- LIP-Coimbra took over Automated LN2 System;

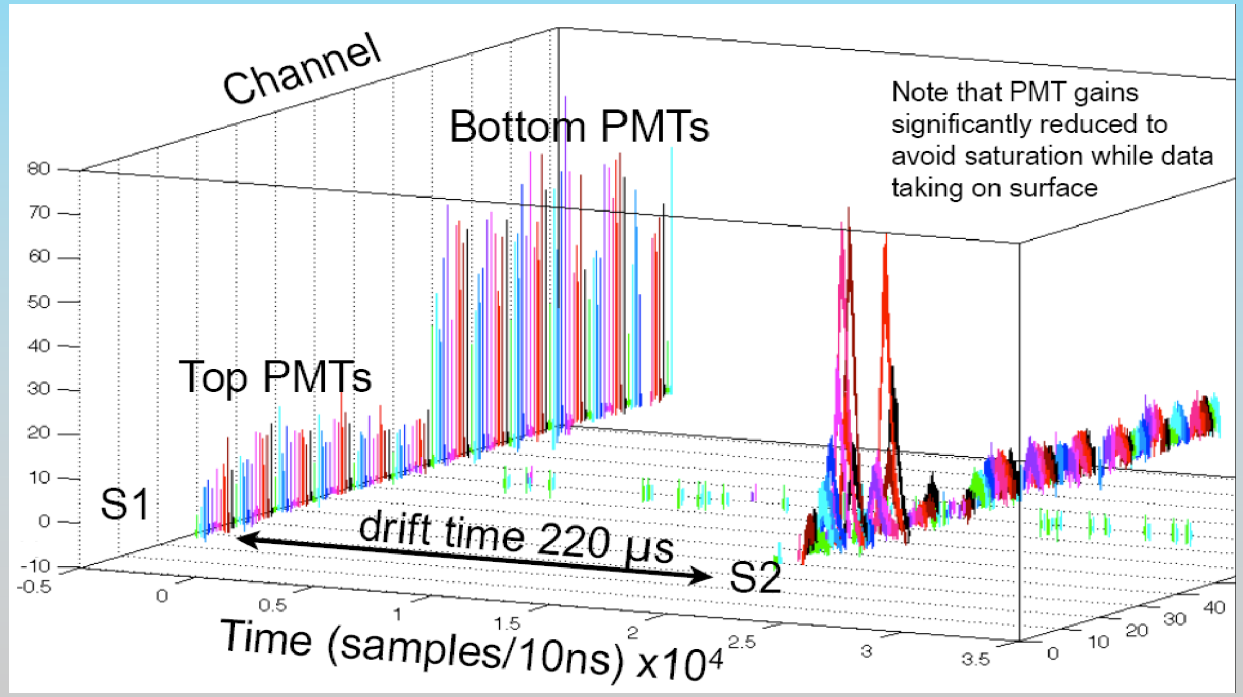


Data Acquisition

- Samples at 105 MHz with 14 bit depth;
- All acquisition channels are working:
  - surface run generated ≈3 TB of data;
- 121 of 122 PMTs are working:
  - one broken base in lower PMT array;

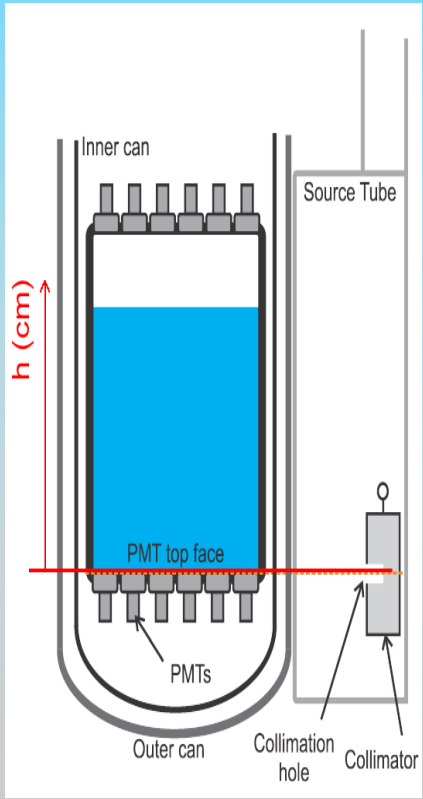
Top array: S2 hit pattern

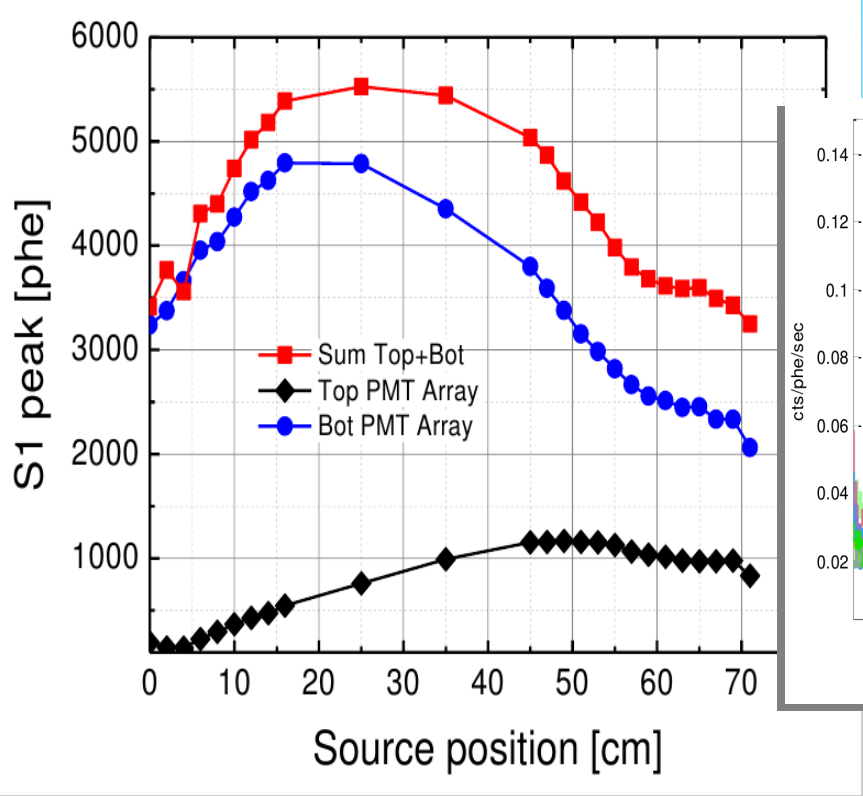


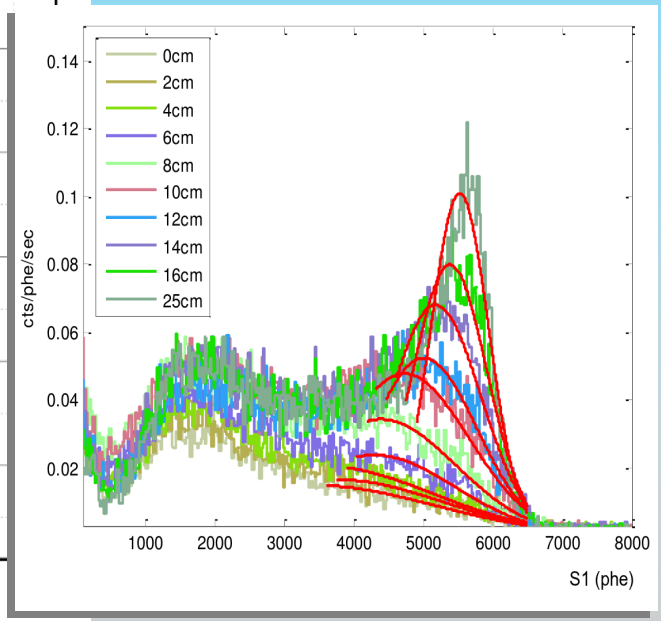


^{137}Cs Calibrations

- γ (662 keV) from ^{137}Cs (collimated):
  - Characterization of light collection with depth (h);
  - LIP-Coimbra took over of the Automated Source Delivery System;

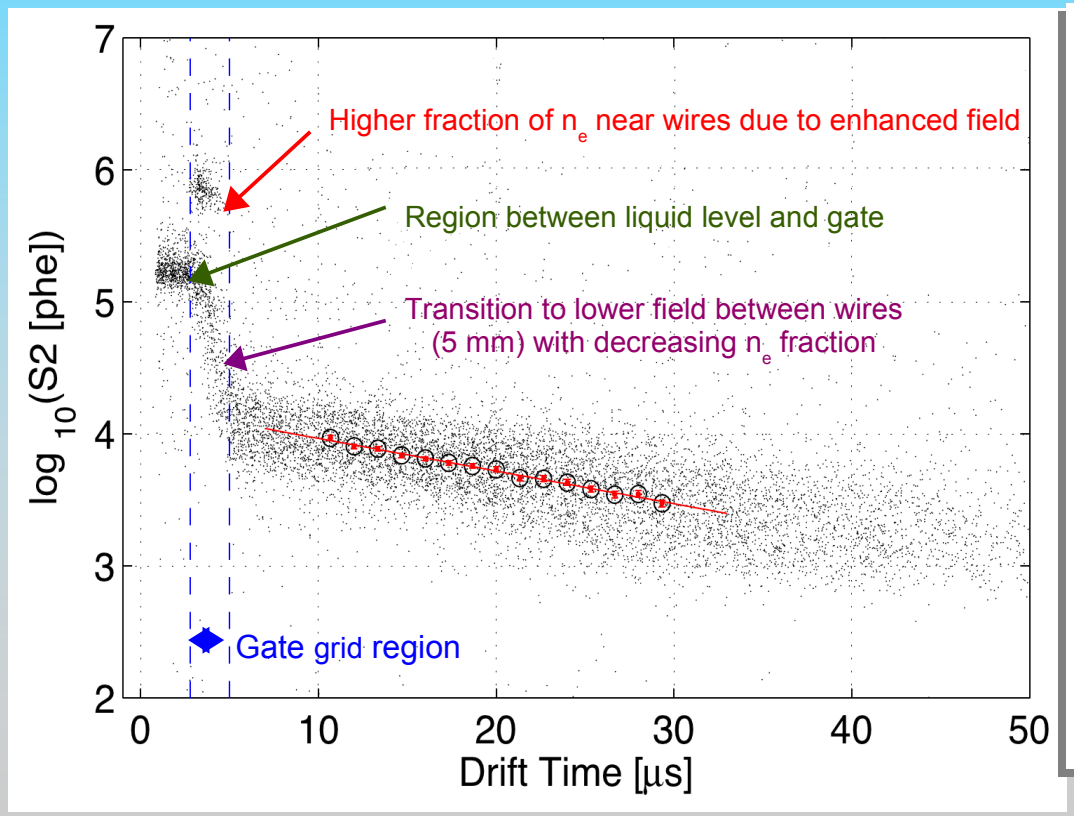


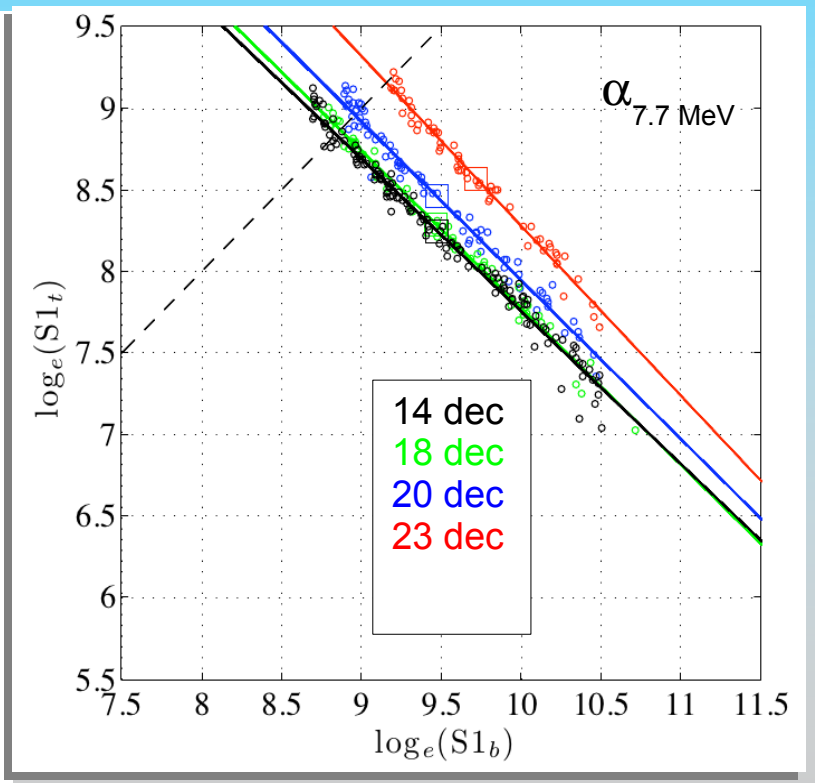




Data analysis with alphas

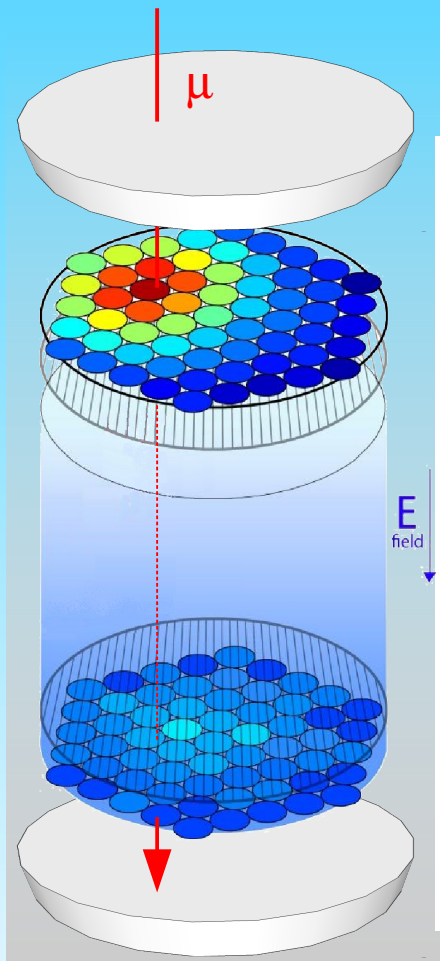
- α (*5.5, 6.0, 7.7 MeV*) from ^{222}Rn decay chain:
  - Train and characterization of the position reconstruction algorithm;
  - Monitoring of the e^- life time (all volume);

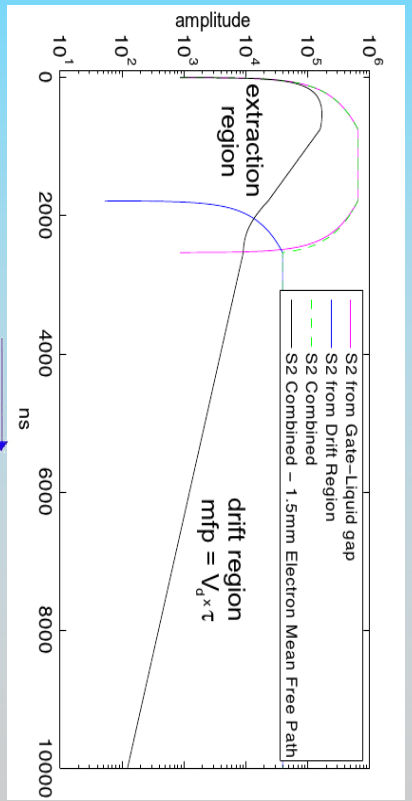


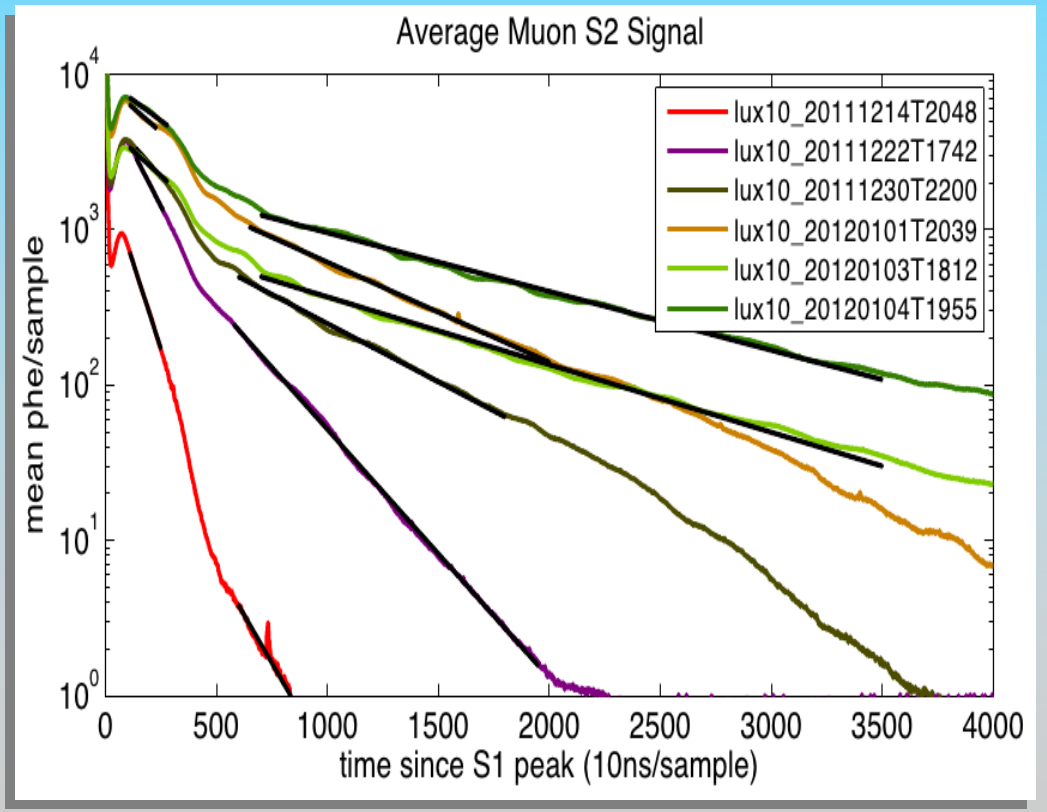


Cosmic muons

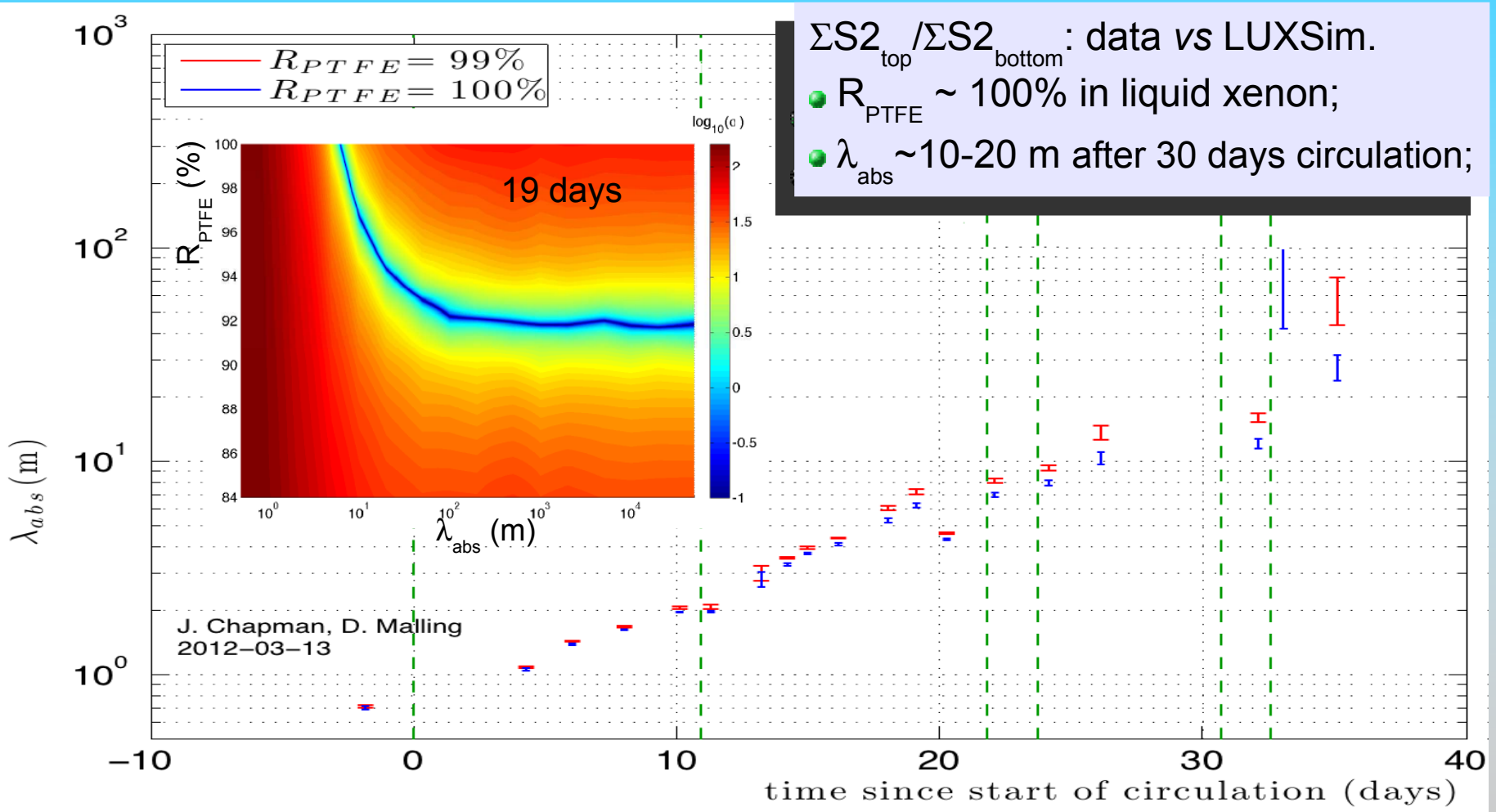
- Trigger from μ hodoscope (plastic scintillator + PMT);
  - Selection of approx. vertical tracks;
  - Monitoring of the e^- life time (all volume);





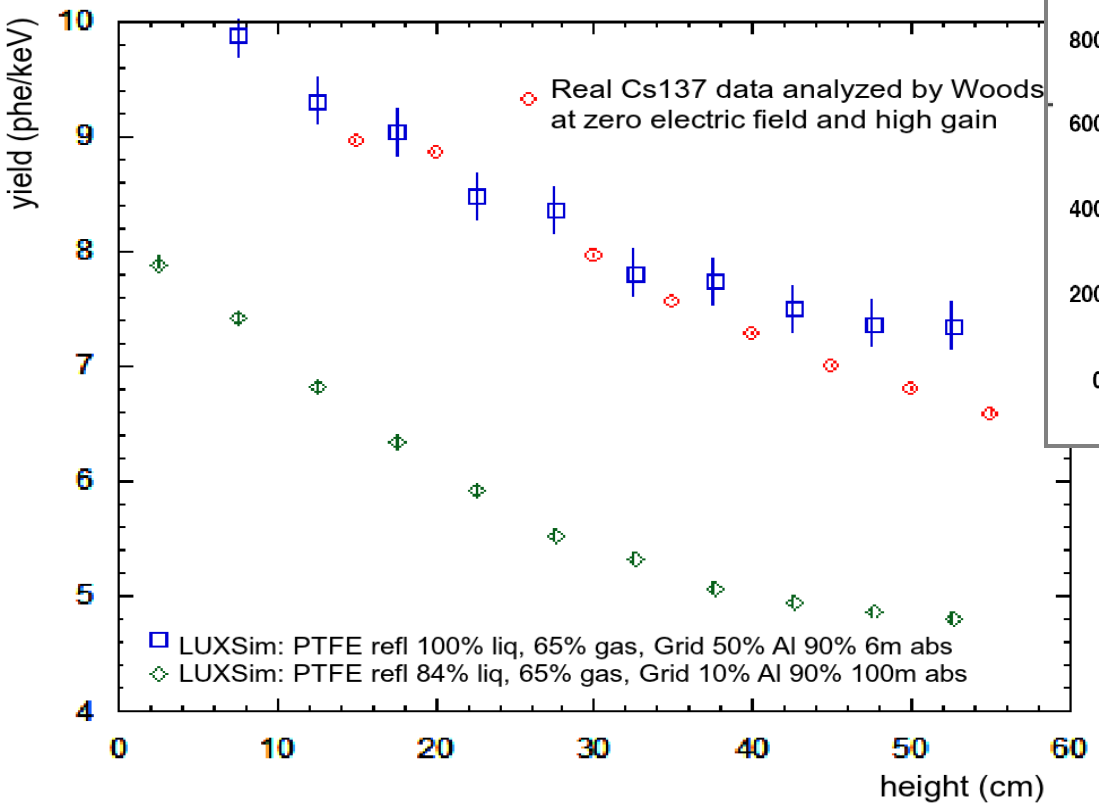


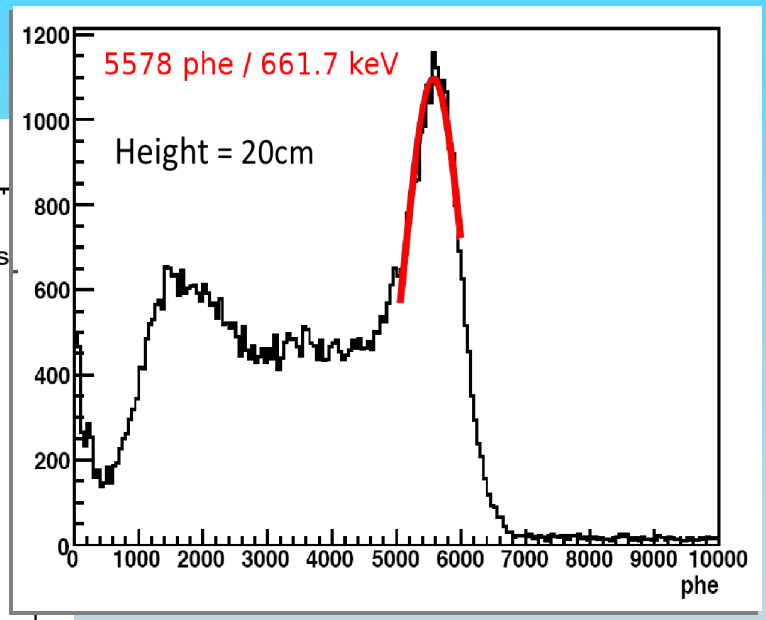
Light collection: λ_{abs}



Light collection: yield (0-field)

Collimated ^{137}Cs calibration: data *vs* LUXSim





≈8 phe/keVee:

- In detector center
- At zero drift field;

Summary

- Deployed into water tank shield;
- Stable cryogenic control for ~100 days of running:
  - Purification @ 35 SLPM (~0.3 ton/day);
- Working PMTs (-1), Trigger and DAQ;
- Excellence light collection (8 phe/keVee in center);
- Important validation of the GEANT4 simulation paramaters;
- Drift field limited to 300 V/cm (limited by cathode feedthrough failure)
- Fast analysis response (liquid level, etc);