Cryogenic Testing of DarkSide-20k Veto Photodetector Units

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Dark Wave

NATIONAL SCIENCE CENTRE POLAND

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veto Photo Detector Unit (vPDU)

Courtesy D. Santone

Astrocent vPDU cold test site

- ISO-7 cleanroom
- Capability of testing 10 vPDUs simultaneously.
- 4 thermocouple sensors to monitor temperature in the dewar.
- Equipped for bagging and shipping of vPDUs.
- Flatbed scanner for dust counting
- MIDAS DAQ and slow control

Flatbed v850 scanner

10 vPDUs capacity holder

Diffuser: PMMA rod

vPDU holder

Base platform: CAEN VME8100VME004 21 Slot 8U

VX2740 64 ch differential

LED: CAEN SP5601 Pulse width: 8 ns, 400 nm

vPDU Test Procedure at Astrocent

vPDU high-resolution scanned for dust

Warm Tests

- IV Measurements
- Current draws at low voltage
- Noise Spectra measurements

Cold Tests

- IV measurements
- Current draws at low voltage
- Noise spectra measurements
- LED charge spectra measurements

Post-test vPDU dust scan; bagging

AstroCeNT: Operations

- Received a total of 5 Peli-cases with 16 vPDUs each (80 in total)
- Tested all 80 vPDUs so far in 15 rounds of test
- The total yield of grade A+B above 80%
- A total of 14 vpdus reworked and another 15 are being reworked this week
- ***Overall, the majority (62%) of vPDUs assembled are cold tested at Astrocent***

Peli-cases

Shockwatchers and shock loggers

Conclusion

- Astrocent has an ISO-7 cleanroom capable of testing 10 vPDUs simultaneously.
- The cleanroom is equipped with MIDAS DAQ and has instruments for bagging and shipping of vPDUs.
- A total of 130 vPDUs produced by Darkside-20k collaboration, and 80 of them were cold tested at Astrocent
- All 80 vPDUs have been tested with yield of more than 80% (grade A+B)
- A total of 29 vPDUs were identified as rework candidates
- 14 vPDUs were reworked in the first round and the other 15 are undergoing rework this week
- Two more rounds of cold tests will be done after the reworking of the 15 vPDUs
- At the end of February planning to ship all vPDUs to Laboratori Nazionali del Gran Sasso for installation in the DarkSide-20k detector
- I also attended a summer school at LNGS in September last year.

THANK YOU