Technological options for SWGO and current design status

Felix Werner[1] and Lukas Nellen[2] on behalf of the SWGO Collaboration

[1] felix.werner@mpi-hd.mpg.de

[2] lukas@nucleares.unam.mx

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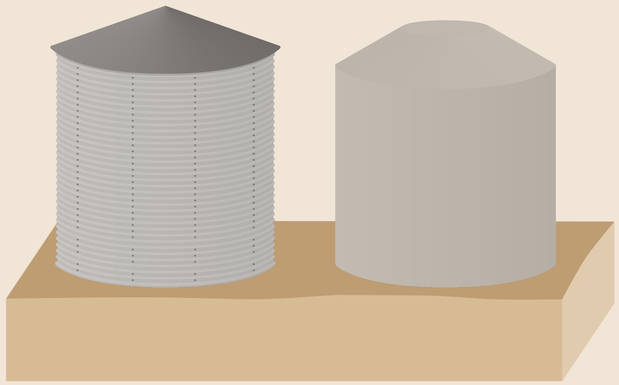
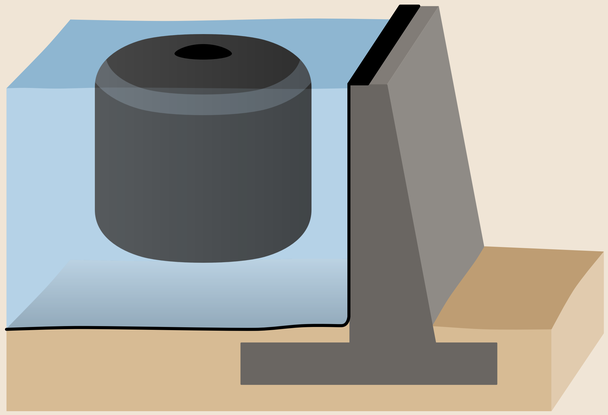
WATER CHERENKOV DETECTOR CONTAINERS

Tanks



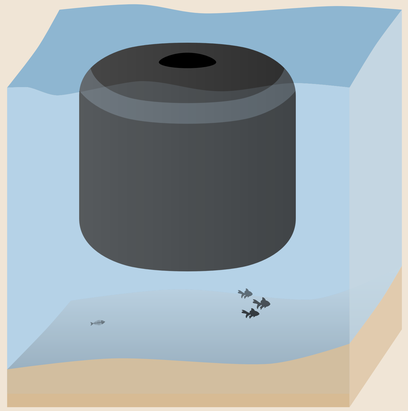
- tanks out of **corrugated steel sheets** (as HAWC) or **roto-moulded HDPE** (as Auger)
- roto-moulding trades off high-altitude construction work with transport from a lower-altitude production site (~similar cost)
- side-entry of particles (air gaps) relevant for double-layer design (esp. for outriggers)
- least constraining on site characteristics

Artificial Pond



- O(10,000 m²)-sized ponds either as **open reservoirs** with floating light-tight bladders or with **light-tight roofs** and curtained cells (as LHAASO)
- in both options a **liner reduces water leakage**
- engineering studies need to show whether this approach can be made cost-effective for a particular site with acceptable risks
- the ponds **may be repurposed by the local community** after the project has concluded

Natural Lake



- light-tight bladders floating at the surface of a **natural high-altitude lake** may be cost-effective if **engineering challenges** can be addressed effectively
- stabilisation, construction, deployment and robustness are studied with prototypes and hydrodynamics simulations
- Peru hosts sufficiently **deep and accessible high-altitude lakes**

Selected Prototypes

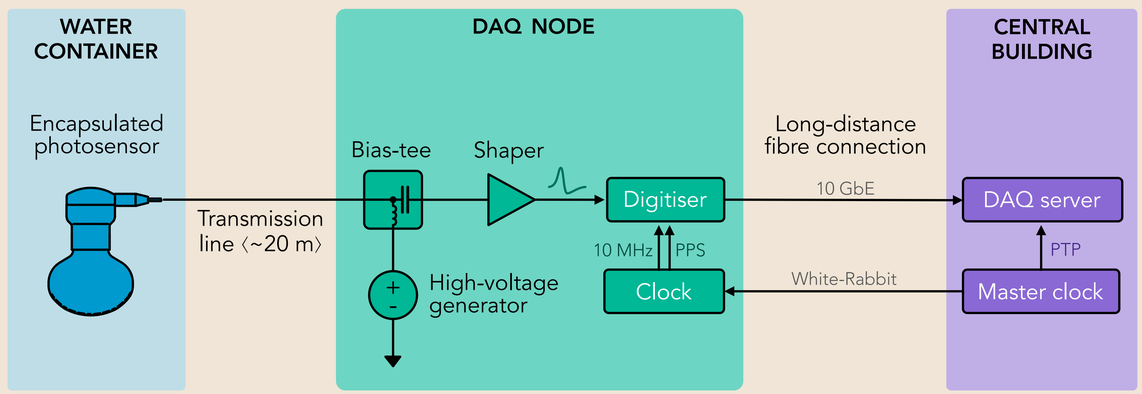
Deployment of a 1st **generation bladder** in a 500 m³ lake simulation tank at MPIK.

Full electronics chain with passive-base PMT, custom phantom HV supply and 250 MS s^{-1} ADC with GbE readout.

ELECTRONICS & DAQ

- the goal is to build a detector that requires little or **no maintenance** over its lifecycle
- favour a modular approach based on **well-proven technologies** such as large-area PMTs and fast pipeline ADCs
- active electronics is to be housed in O(100) **weatherproof outdoor cabinets,** DAQ nodes, each serving tens of detector units
- DAQ nodes transmit **waveforms** via commodity 10 GbE network devices to central computing for pulse reconstruction, calibration and array-level trigger formation **purely in software**

Node-based Architecture



Linked ICRC2021 Proceedings

This contribution
▸ https://pos.sissa.it/395/714/

SWGO status and prospects
▸ https://pos.sissa.it/395/023/

Lake-based detector studies
▸ https://pos.sissa.it/395/708/

Double-layered WCD design
▸ https://pos.sissa.it/395/902/

Shallow WCD design with 4 PMTs
▸ https://pos.sissa.it/395/707/