

Lake Deployment of SWGO Detector Units

Hazal Göksu on behalf of the SWGO Collaboration

Max-Planck-Institut für Kernphysik, Saupfercheckweg 1, 69117 Heidelberg

The Lake concept is one of the alternative designs for SWGO. Bladders filled with clean water are deployed near the surface of a natural lake, where each bladder is a light-tight stand-alone unit containing one or more photosensors.

Initial Tests

Tests with small transparent bladders to check

- Mechanical stability
- Behavior under waves & impact
- Different water fill levels



Generation 0 Bladder

- Commercial PVC bladder¹
- Hatch attached to a photomultiplier tube (PMT)
- Handles to attach floaters

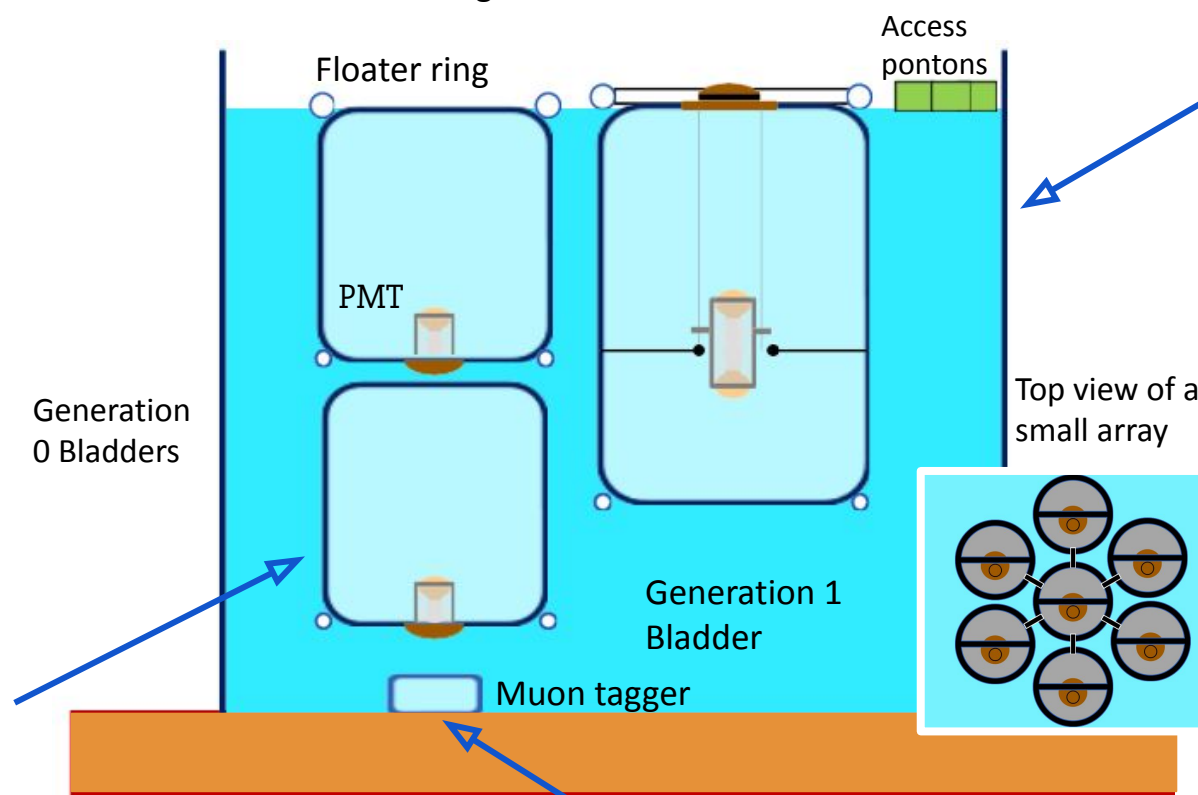
Tested for air tightness and light tightness



Tests inside the lake simulation tank

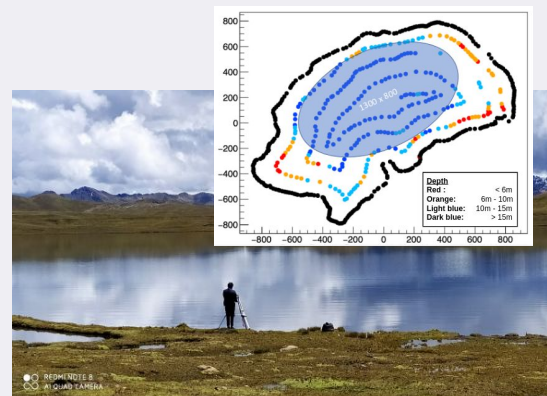
Generation 0 bladders: Two separate cells, top cell for electromagnetic detection, bottom cell for muon detection

Generation 1 bladder: Single bladder with a membrane in the middle



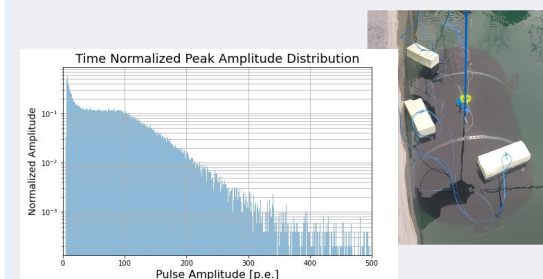
Lake Site

- Lake candidates in Peru
- Depth survey conducted
- One of them is suitable for a 1 km² array of bladders



Muon Tagger

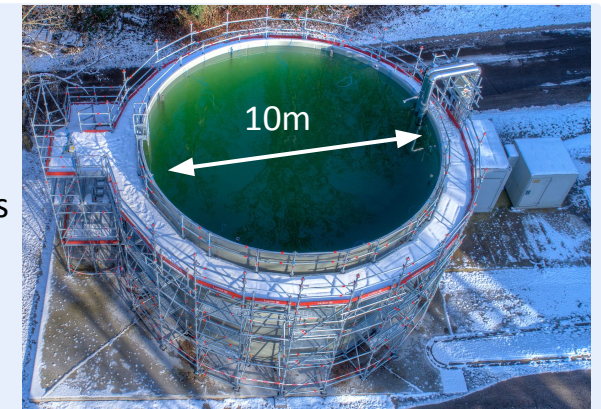
- For having well defined particle trajectories
- A barrel filled with clean water, where a PMT is mounted inside
- Presently inside the tank, detecting muons at a rate ~20 Hz



Lake Simulation Tank

Built at MPIK for prototype studies

7m height
500 m³

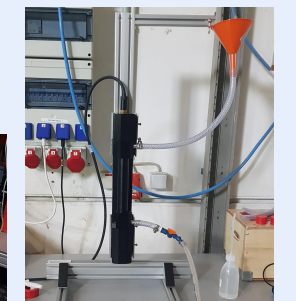
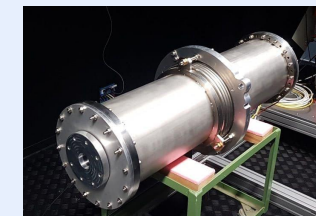


Material Tests



Wavelength-dependent integrated reflectivity

Light tightness test of materials with a PMT

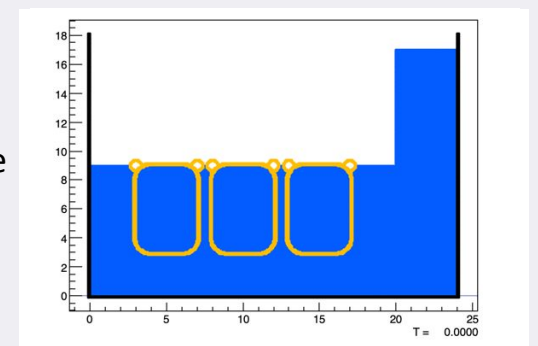


Water transparency monitoring at 400 nm

Hydrodynamics Simulations

- Determine wave loads on bladders and the resulting strength requirements
- Smoothed particle hydrodynamics (SPH) methods
- Water is simulated as a collection of little particles

Simulation of a bladder under wave motion, using *PersianSPH*²



For more information:

<https://pos.sissa.it/395/346>

Web: <https://www.swgo.org>

hgoksu@mpi-hd.mpg.de, werner.hofmann@mpi-hd.mpg.de

References:

²<https://korzani.wixsite.com/persiansph>
¹<https://luftwerbung.de/>