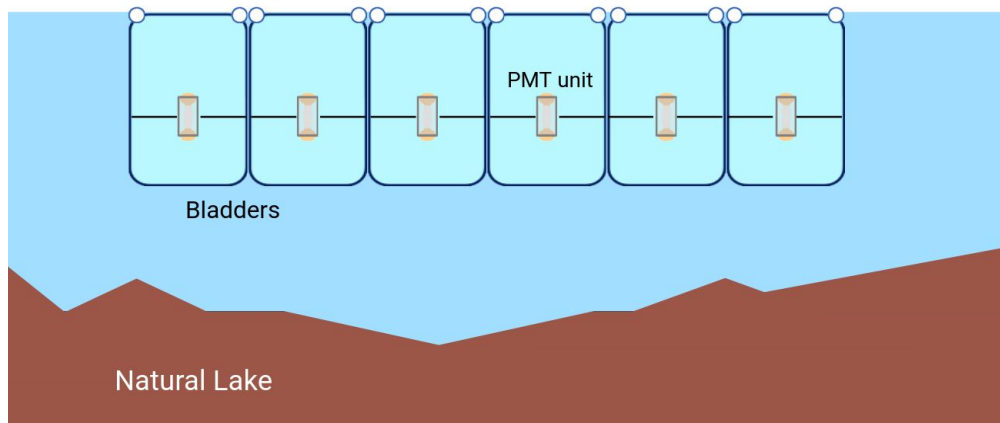
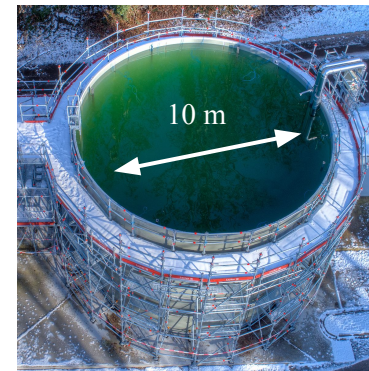


The Lake concept is one of the alternative designs for SWGO. Bladders filled with clean water are deployed near the surface of a natural lake, where each bladder is a light-tight stand-alone unit containing one or more photosensors.



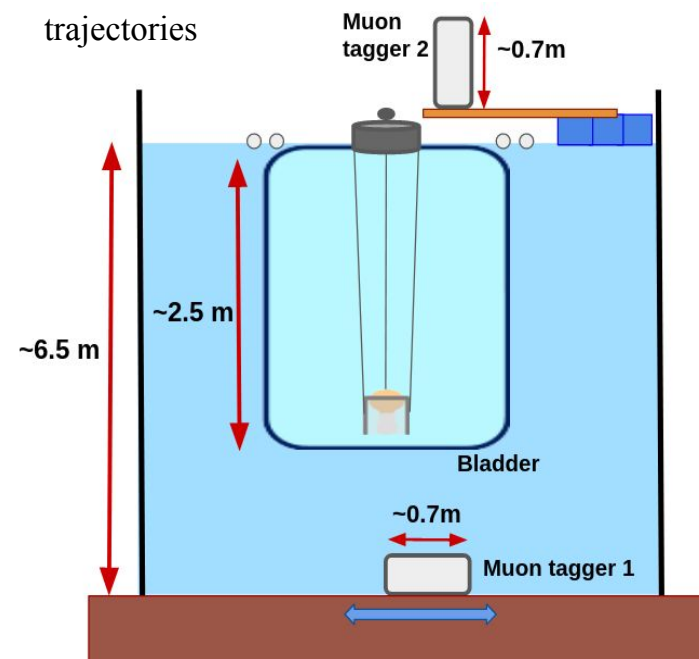
Tests inside the lake simulation tank

Built at MPIK for prototype studies
7m height
500 m³

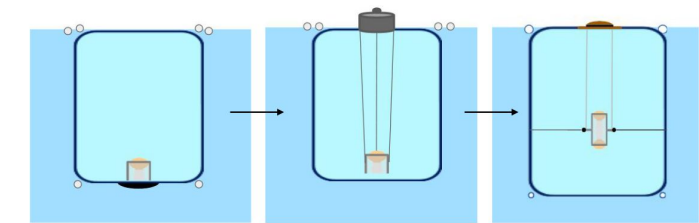


Current setup:
Single-chamber PVC bladder with PMT

- PE rings to keep bladder afloat, define its shape and interconnect multiple bladders
- Two muon taggers (barrels with PMT and water and/or scintillator) provide well-defined particle trajectories



Prototyping the Unit Detector



From a single-cell bladder with simple PVC material to a realistic bladder with two cells and fully light-tight material preserving water quality, with the lower cell an inner lining of reflective material



First generation:
Single-cell simple
PVC bladder¹

Second generation:
Single-cell geoflex
bladder²



Advantages

- Potential cost reduction
- Reduced constraints on unit dimensions
- Improved muon detection
- Flexible arrangement

Challenges

- New technology
- Mechanical stability under water motion
- Continuous position calibration required

Wave motion

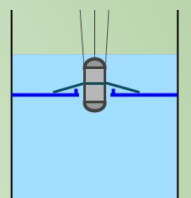
- Upcoming on-site tests to examine the impact of wave motion on unit detectors
- Hydrodynamics simulation studies

Material tests

- Water degradation constantly monitored
- Reflectivity and light transmission properties of each material is measured with dedicated setups

Making a Double Chamber Bladder

- Mechanical tests on membrane dynamics
- Tests with double-PMT unit suspended from the top hatch into a hole in the cell-dividing membrane



Coincidence data taking

- Expect three-fold coincidences from penetrating muons
- Measured coincidence times compatible with geometry
- Double peaks due to combination of water + scintillators

