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Development of a lake array proposal for SWGO

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The Southern Wide-field Gamma-ray Observatory (SWGO) is a proposed next-generation gamma-ray survey experiment that will cover the southern sky with high sensitivity and a wide field of view. It will be built in South America to complement HAWC and LHAASO in the Northern Hemisphere. We designed a lake array proposal for SWGO to record particles from extensive air showers initiated by high energy gamma-rays. The proposed lake array would consist of two types of detectors: surface detectors and muon detectors. Surface detectors will be placed on the lake for the detection of electromagnetic particles. They are small tanks filled with water and equipped with a photomultiplier tube (PMT) at the bottom. Muon detectors will be deployed underwater, where lake water will be a natural filter to absorb electromagnetic components while allowing the measurement of muon particles. A lake array is being proposed for SWGO motivated by some potential advantages over ground-based arrays, such as lower cost, fewer constraints on the detector shape, and electromagnetic component rejection for muon detectors, which create more possibilities to optimize detectors and the array. A number of technological solutions are being proposed for the implementation of SWGO, including both lake- and ground-based arrays, and a final decision on the adopted technology is expected for 2024, with the conclusion of the project's R&D phase.

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