

Detector Development for the Southern Wide-field Gamma-ray Observatory (SWGGO)

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SWGGO is designed to detect gamma rays ranging from a few hundred GeV to several PeV. The observatory will be graded, varying the detector unit spacing over the whole array to ensure sensitivity over such a wide energy range. The reference configuration assumes an inner zone of 160 m radius, with about 5,700 detector units, and an outer zone of 300 m radius, with an additional 880 detector units. This design is the basis for detector R&D and for studying alternative layouts. In particular, we consider additional configurations with the detector area expanded to 1 km² to extend the observatory’s sensitivity well into the PeV range. Gamma-induced extensive air showers are distinguished from the more numerous hadron-induced showers by measuring the number of muons on the ground. To enhance the observatory’s gamma-hadron separation ability, the reference design for a detector unit consists of one cylindrical water Cherenkov detector divided into two compartments. The larger upper compartment detects all air shower components and is used for timing and calorimetry. The lower compartment primarily detects muons and is intended to help to reject muon-rich hadronic showers. An intense R&D program comparing proposed alternatives to the reference design is being performed to optimize cost and performance. We will discuss the mechanical design, photo sensors, readout electronics, and data acquisition system of the detector. We will also discuss other aspects of the observatory, such as calibration, slow controls, and general operation.

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*Speaker

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 - 3. Photo Detector**
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