



Contribution ID: 371

Type: Poster

The Inner Baseline Array Design of the Southern Wide-field Gamma-ray Observatory (SWGGO)

The Southern Wide-field Gamma-ray Observatory (SWGGO) is a planned next-generation ground-based water Cherenkov detector array designed for high-energy gamma-ray astronomy. SWGGO will consist of a dense, tightly packed inner array surrounded by a sparse outer array. The technology choices for the inner array have been narrowed into a baseline design, which consists of optically isolated steel tank units, each housing a light-tight bladder. This modular, scalable system allows for optimization and expansion based on scientific needs. The steel tanks will have a diameter of 5.2 m and a height of 4 m, enclosing custom-designed bladders filled with purified water, forming the primary water Cherenkov detector units. The bladders will be double-layered, where the lower layer is used for background rejection. Each bladder will be equipped with two large-area photomultiplier tubes (PMTs), arranged such that one faces upward and the other downward within each chamber. Field nodes will be used to digitize up to 100 channels per node, with all signals transmitted via optical fibers to a central control room for processing. Prototype units consisting of steel tanks, bladders, and PMTs have already been constructed and are currently in operation, demonstrating the functionality and feasibility of the design.

Collaboration(s)

The Southern Wide-field Gamma-ray Observatory (SWGGO)

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Session Classification: PO-2

Track Classification: Gamma-Ray Astrophysics