



Contribution ID: 92

Type: **Oral presentation**

VHE Sky Monitoring with the Southern Wide-field Gamma-ray Observatory

Monday, 12 September 2022 15:30 (20 minutes)

The Southern Wide-field Gamma-ray Observatory (SWGGO) is the proposal for a new ground-based gamma-ray instrument in the Southern Hemisphere, which will use an array of water-Cherenkov based particle detectors to provide continuous monitoring and regular scanning of a large portion of the sky at the very- and ultra-high-energies (VHE and UHE, respectively). At the low energy side, SWGGO aims to push the observational range of wide-field ground-based gamma-ray facilities down to a few hundred GeV, thus bridging the gap between space and ground-based facilities in the monitoring of the VHE sky. In so doing, SWGGO could become a unique instrument in the search for short time-scale transient phenomena, being an important addition to the global network of multi-messenger astrophysics. In the high energy domain, on the contrary, it will benefit from the optimal coverage of the Galactic Plane to map the distribution of UHE sources in the inner parts of the Galactic disk and close to the Galactic Center, leading to an extraordinary improvement of our ability to identify their most likely counterparts. In this contribution, we will describe the potential of SWGGO to constrain the physics of VHE emission and particle acceleration in gamma-ray sources powered by relativistic jets and energetic shocks. We will discuss its role in our understanding of the origin of the spectrum of high energy particles and its contribution to the global network of multi-messenger facilities.

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Session Classification: Gamma Rays