The Southern Wide field-of-view Gamma-ray Observatory Harm Schoorlemmer for the SWGO collaboration



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MAX-PLANCK-GESELLSCHAFT

Detection techniques in ground-based gamma-ray astronomy

4-5 km -----Cherenkov Light **IMAGING ATMOSPHERIC** CHERENKOV TELESCOPE ARRAY

Shower image, 100 GeV γ-ray adapted from: F. Schmidt, J. Knapp, "CORSIKA Shower Images", 2005, https://www-zeuthen.desy.de/~jknapp/fs/showerimages.html



Complementarity



Energy

- Accurate background determination
- Long exposure

Good energy and angular resolution

Surveying the southern sky

The northern sky is surveyed by HAWC and LHAASO
We propose a nextgeneration facility in the southern hemisphere





Surveying the southern sky

Extended sources

- Fermi Bubbles Galactic Centre region (Dark Matter Annihilation)
- Halos around evolved sources

High energy reach

 Deepest unbiased search for hard spectrum sources: **PeVatron accelerators** Galactic Centre region





see also: arXiv:1902.08429 & PoS(ICRC2019)786



Monitoring the variable sky

Transients

- Gamma-Ray Bursts
- Alert & Follow-up on all time and angular scales
- Gravitation Waves,
- Fast Radio Bursts, etc.

Variability

- Monitor active galactic nuclei every day
- Archival data, neutrino counter parts
- Alert CTA







PoS(ICRC2019)786

Southern Wide field-of-view Gamma-ray Observatory collaboration

Founded on the first of July 2019.

Collaboration for a three years R&D program to obtain a single full observatory design.

Design specifications:

- Location: South America, lattitude between 10°S 30°S
- Elevation above 4.4 km
- Denser and larger than HAWC: Dense inner array, sparse outer array
- Primarily based upon the water-Cherenkov technique, with possibilities for enhancements and extensions
- Energy range 100s of GeV to 100s of TeV
- Modular and scalable design
- Target cost €40M-50M

www.SWGO.org

Southern Wide field-of-view Gamma-ray Observatory collaboration

Organization

Founded from previous efforts: SGSO, LATTES and STACEX, ++

Members

- 42 institutes (>90 members)
- 15 supporting scientists
- Steering committee

Working groups

- -Science
- -Analysis & simulation -Site
- -Detector development

-Outreach

www.SWGO.org



Countries in SWGO

Institutes

Argentina*, Brazil, Czech Republic, Germany*, Italy, Mexico, Portugal, United Kingdom, United States*

Supporting scientists

Australia, Chile, France, Japan, Slovenia

*also supporting scientists











Software development

Software framework

- Started from HAWC software
- Speed-up development
- Compare performance
- Hosted on <u>www.gitlab.com</u>:

-Soon public





First steps:

- Easily adaptable detection units¹⁾
- Configurable array layout
- Example events:
- Large array to lower the threshold²⁾.
- -2 TeV illustrates the wealth of information at this intermediate energy

¹⁾ *PoS(ICRC2019)720*

²⁾ EPJ-C, HS J.A. Hinton, R. Lopez-Coto, (2019)







Peru / Cusco Alt: 4.9 km

Peru / Arrequipa Alt: 4.5 km

Bolivia / La Paz Alt: 4.7km, ALPACA

Site Search Argentina and Chile







Chile / ALMA Alt. 5 km



Argentina / Salta Alt. 4.8 km

Thank you for your attention!

Do .

Want to join us? — Come and see me at this conference or visit <u>www. SWGO.org</u>

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