

The Southern Wide-field Gamma-ray Observatory reach for Primordial Black Hole evaporation

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Primordial Black Holes

- Primordial Black Holes (PBHs) are BHs whose nature is similar - but whose origin is different - than that of the stellar BHs.
 - Originated in a radiation dominated era.
 - They do not count for the total baryonic mass of the Universe.
 - Their masses can range from the Planck scale up to supermassive BHs.
- PBHs of mass 10^{14} g, generated in the Big Bang, should be evaporating ~now
 - They should emit a flash of gamma rays according to the Standard Evaporation Model
 - this flash can be detectable in the GeV/TeV regime.

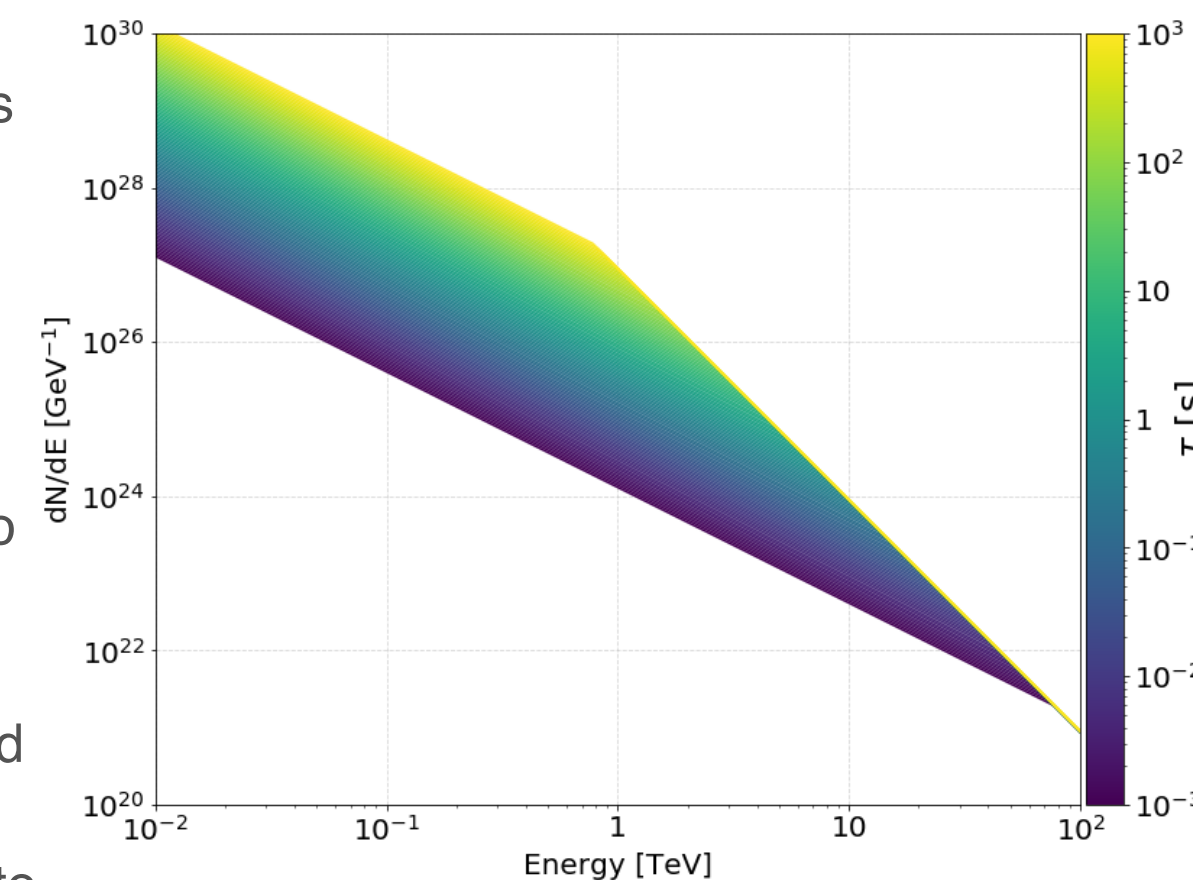


Fig.1: Intrinsic spectrum for different duration bursts

SWGO

- The Southern Wide-field Gamma-ray Observatory will be the next generation of ground-based gamma-ray facilities using the particle detection technique
 - Located in the Southern Hemisphere to be complementary to instruments like HAWC and LHAASO
 - Will be composed of an dense inner detector and a sparse outer one.
 - Currently in its design phase

VHE gamma-ray observations and Prospects with SWGO

- Limits established by several Ground-based observatories and satellites in gamma rays
- Thanks to its wide FoV, wide energy coverage and large collection area, SWGO will be able to establish the best limits for integration times < few hundreds of seconds.
 - With 1 year of observations they are already a few times lower than those currently established by HAWC.
 - For 10 years of observations already at the level of < 50 bursts $\text{yr}^{-1} \text{pc}^{-3}$

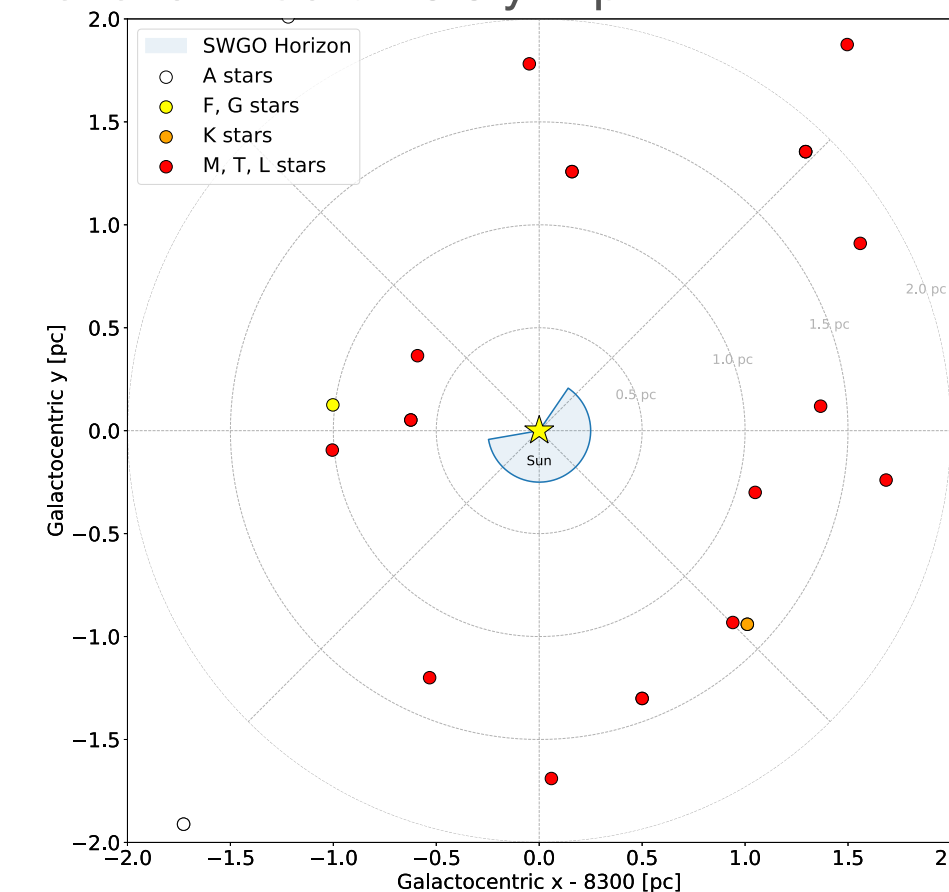


Fig.3: Galactocentric horizon sensitivity of SWGO. Also included stars located nearby the Earth.

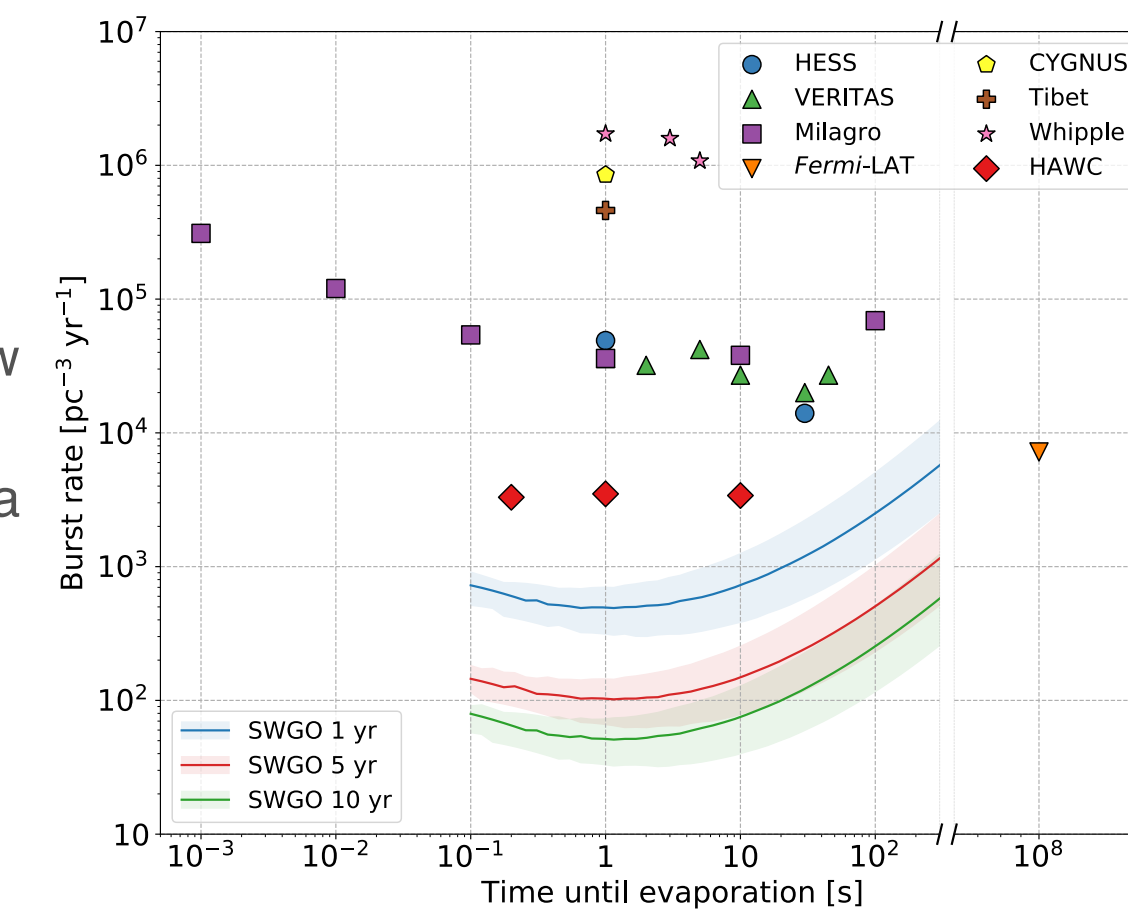


Fig.2: SWGO combined sensitivity to PBH bursts of different durations compared to results of different experiments.

- Reach of ~ 0.25 pc, close to the nearest stars
- Complementary to the search that will be performed by LHAASO in the Northern hemisphere.

More info about this contribution in [arXiv:2103.16895](https://arxiv.org/abs/2103.16895)

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