

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

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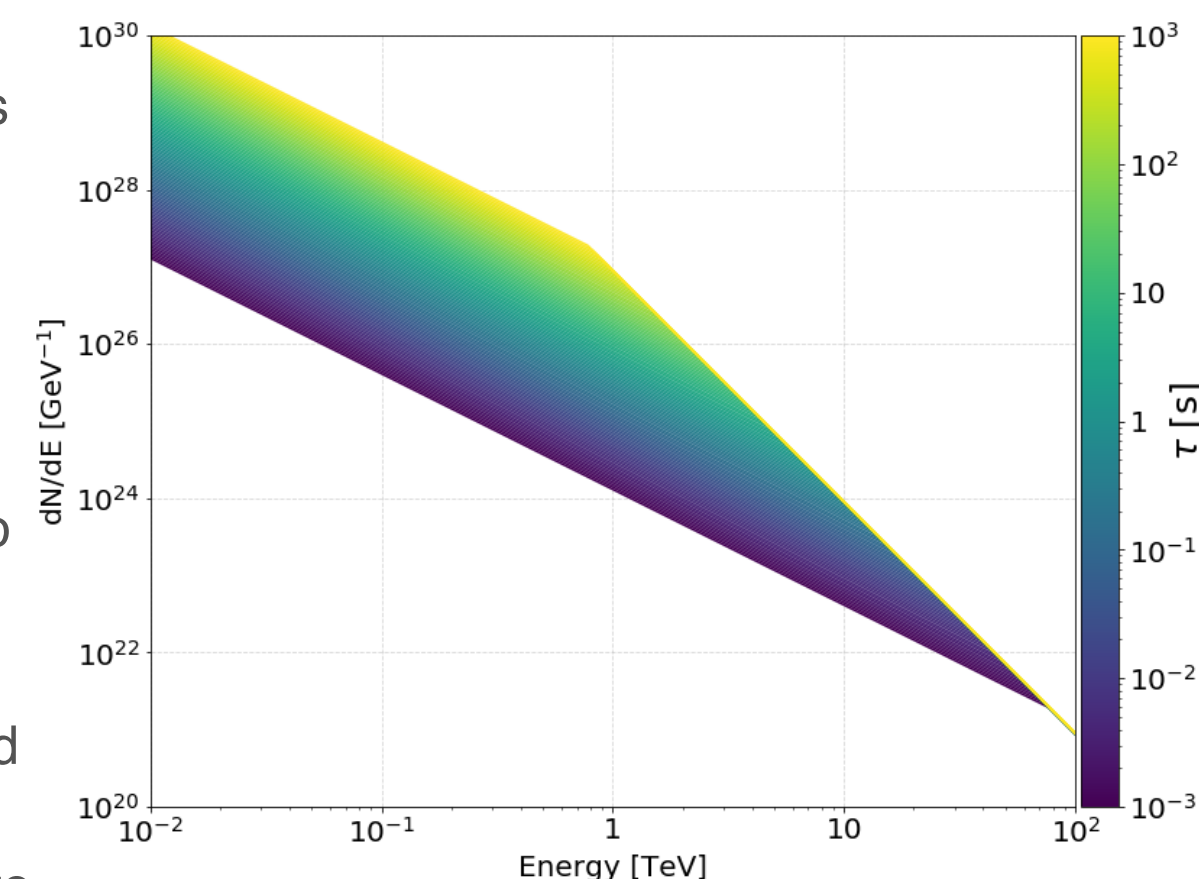
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## Primordial Black Holes

- 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.



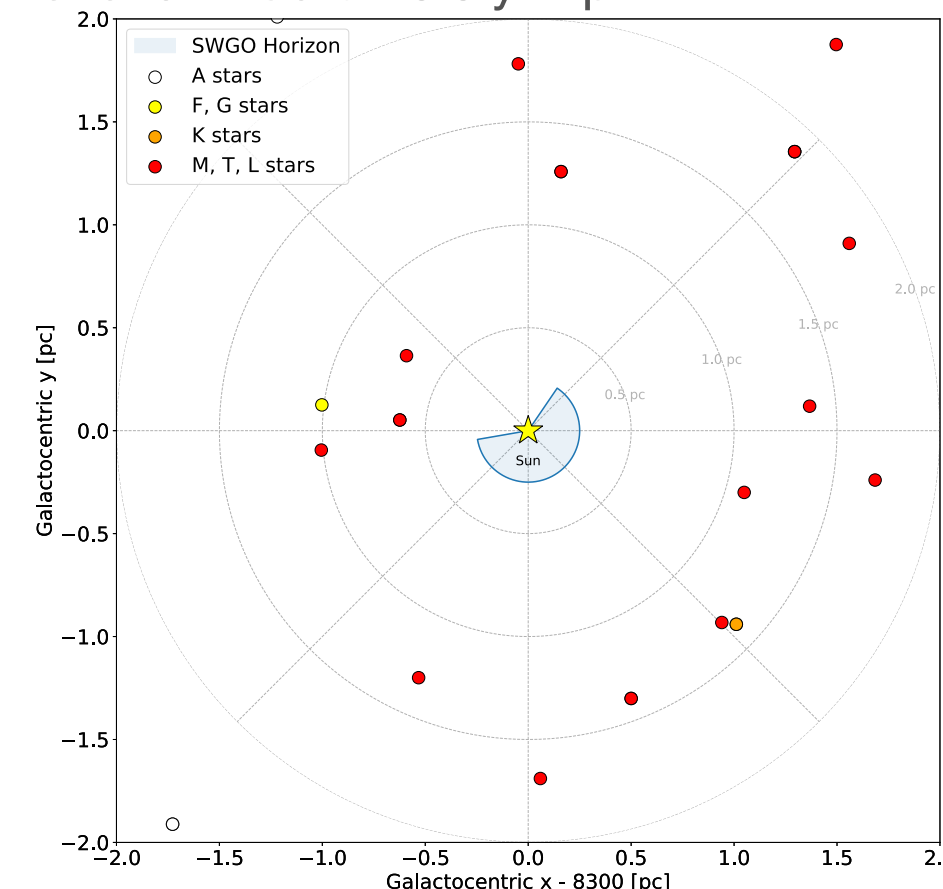
**Fig.1:** Intrinsic spectrum for different duration bursts

## SWGO

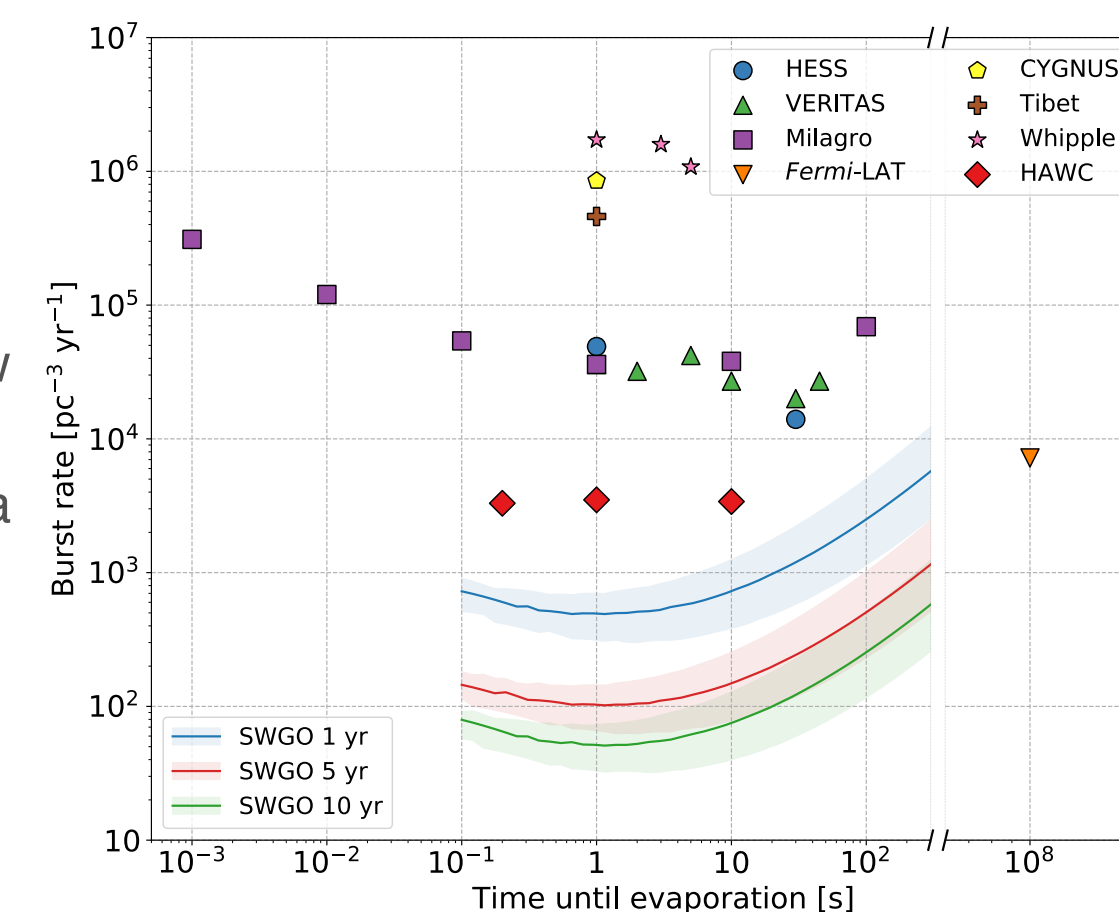
- The Southern Wide-field Gamma-ray Observatory will be the next generation of ground-based gamma-ray facilities using the particle detection technique
  - Located in the Southern Hemisphere to be complementary to instruments like HAWC and LHAASO
  - Will be composed of an dense inner detector and a 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  $\sim 0.25$  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)

## Acknowledgements: