

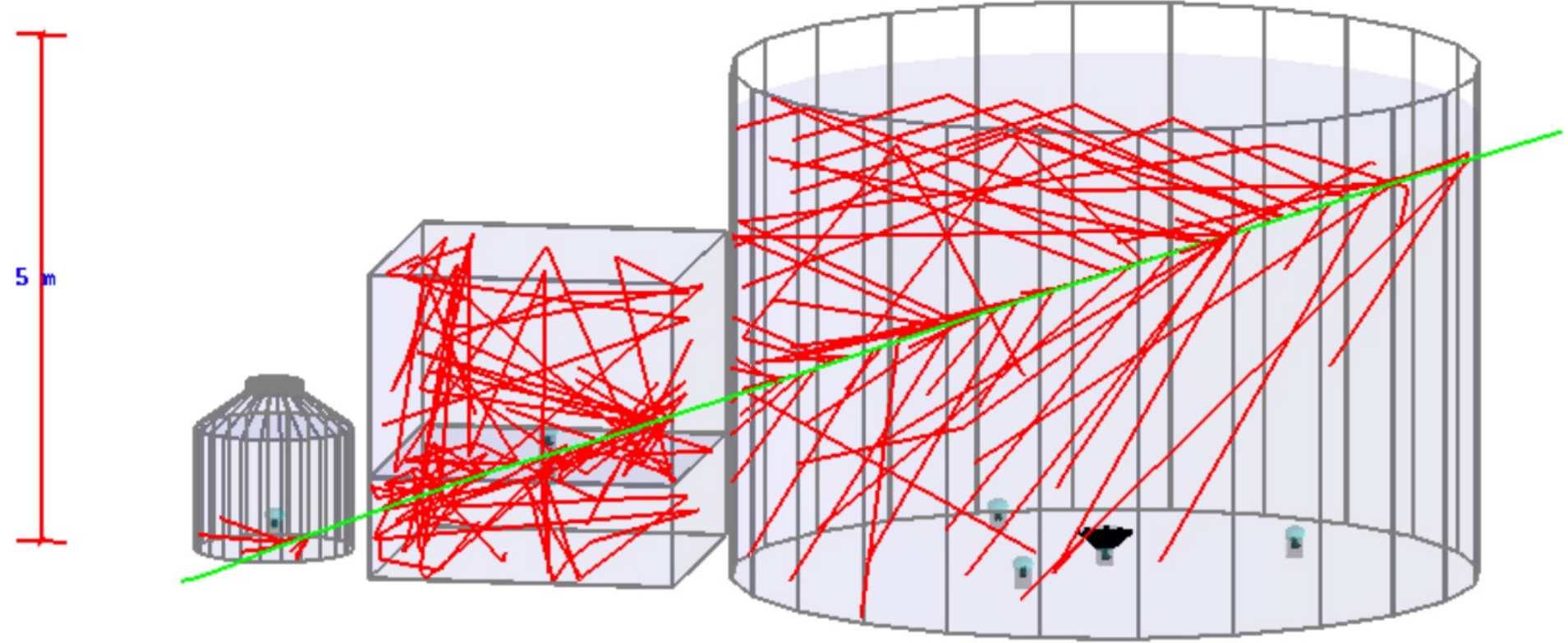


## MOTIVATION

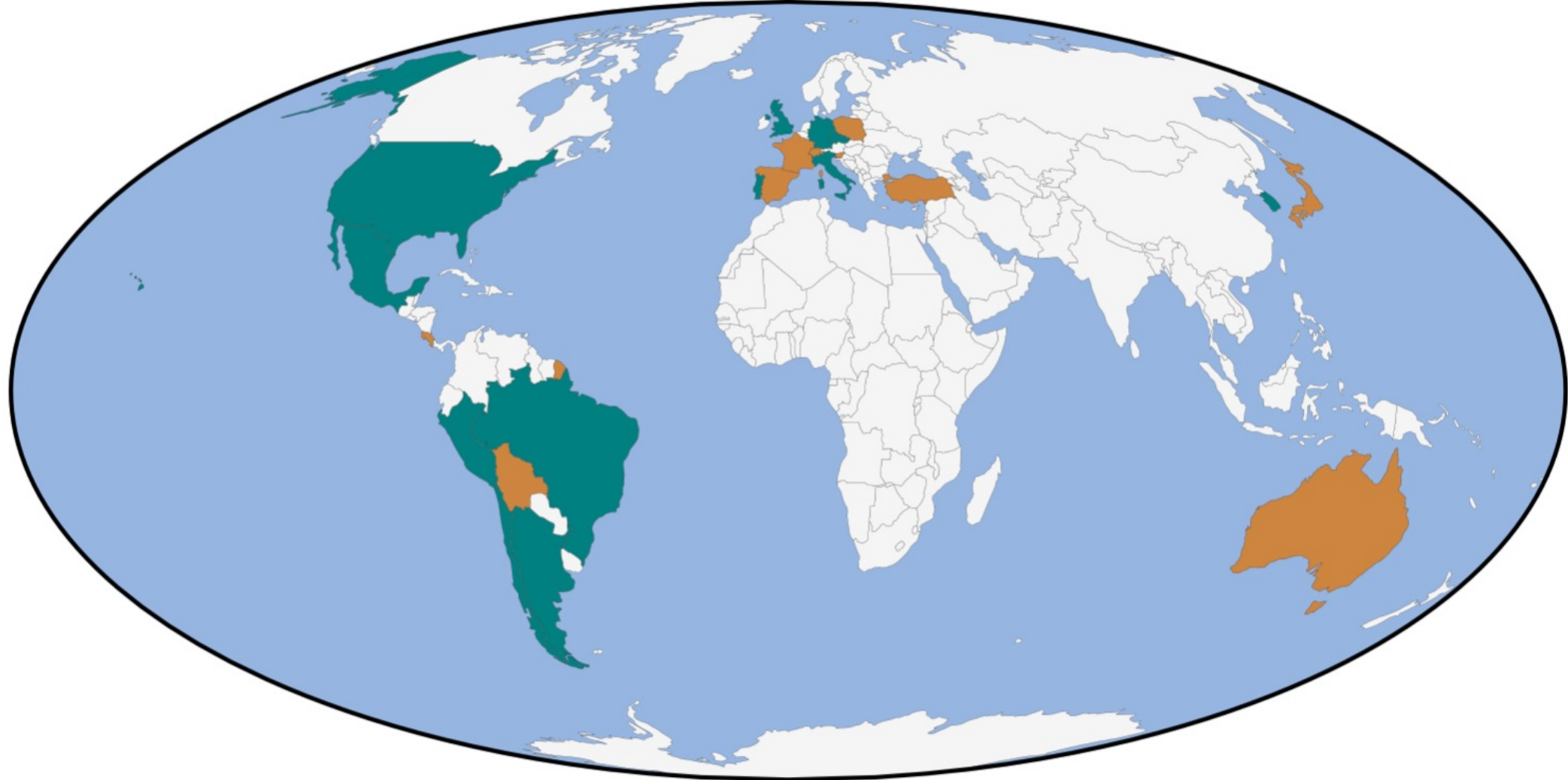
- No very-high-energy ground-based gamma-ray observatory surveying the Southern Hemisphere
- The proposed next-generation gamma-ray survey observatory SWGO will disclose the full Southern Hemisphere for the first time up to hundreds of TeV
- SWGO would provide the currently missing observatory for multi-frequency, multimessenger studies
- This project is currently in the R&D phase and here is presented, on behalf of the SWGO Collaboration ([www.swgo.org](http://www.swgo.org)), the observatory's concept and proposed science

## DETECTOR CONCEPT

- Core unit is a water Cherenkov detector
- Wide energy band (100s of GeV–100s of TeV)
- Will be built at very-high altitude (>4.4 km), between -15° and -30° latitude
- Strong muon detection capability



## THE SWGO COLLABORATION



### Countries in SWGO

#### Institutes

Argentina\*, Brazil, Chile, Czech Republic, Germany\*, Italy, Mexico, Peru, Portugal, South Korea, United Kingdom, United States\*

### Supporting scientists

Australia, Bolivia, Costa Rica, France, Japan, Poland, Slovenia, Spain, Switzerland, Turkey

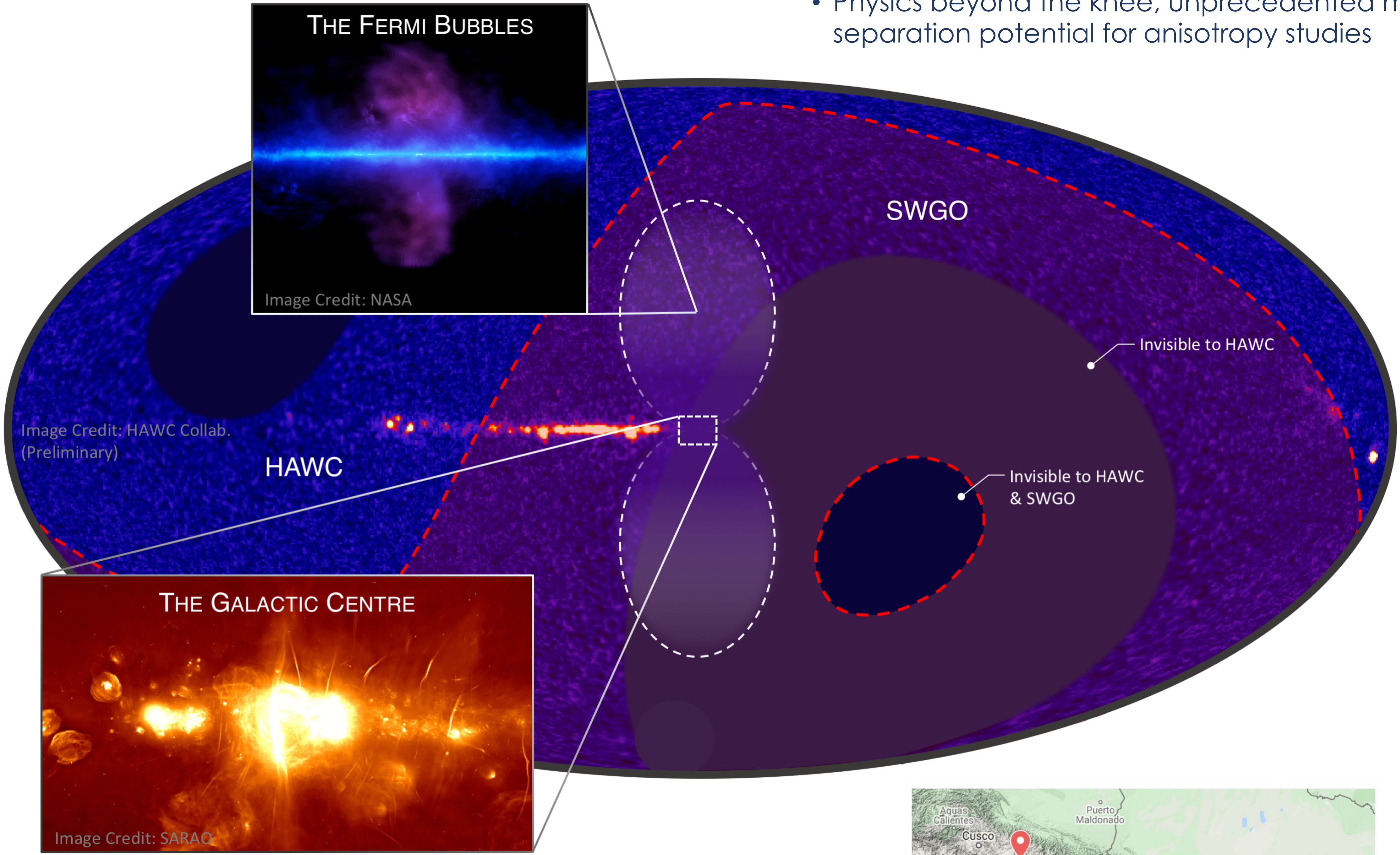
\*also supporting scientists

## CORE SCIENCE CASE: FUNDAMENTAL PHYSICS

- Indirect detection of WIMP Dark Matter
  - Probe for heavy DM above 100 TeV
  - Thermal WIMP DM searches in galactic center
  - Observations of dwarf galaxies and galaxy clusters
- Evaporation signals from Primordial Black Holes
  - Could constitute a fraction of DM
- Probe of Lorentz Invariance Violation
  - Multiple constraint paths, e.g., photon decay, gamma-ray bursts
- Search for VHE gamma rays from Axion-Like Particles (ALPs)
  - ALPs are a well-motivated DM candidate

## CORE SCIENCE CASE: ASTROPARTICLE PHYSICS

- Survey the high-energy transient sky
  - Gamma-ray bursts, gravitational waves, fast radio bursts, high-energy neutrinos
- Search the Galactic plane for astrophysical particle accelerators
  - Including PeVatrons
- Survey nearby pulsars in the Southern Hemisphere
  - Access the Galactic population of PWNe and gamma-ray halos
- Detect VHE gamma rays from blazars and radio galaxies
- Constrain cosmic-ray physics
  - Physics beyond the knee; unprecedented mass-separation potential for anisotropy studies



## CANDIDATE SITES

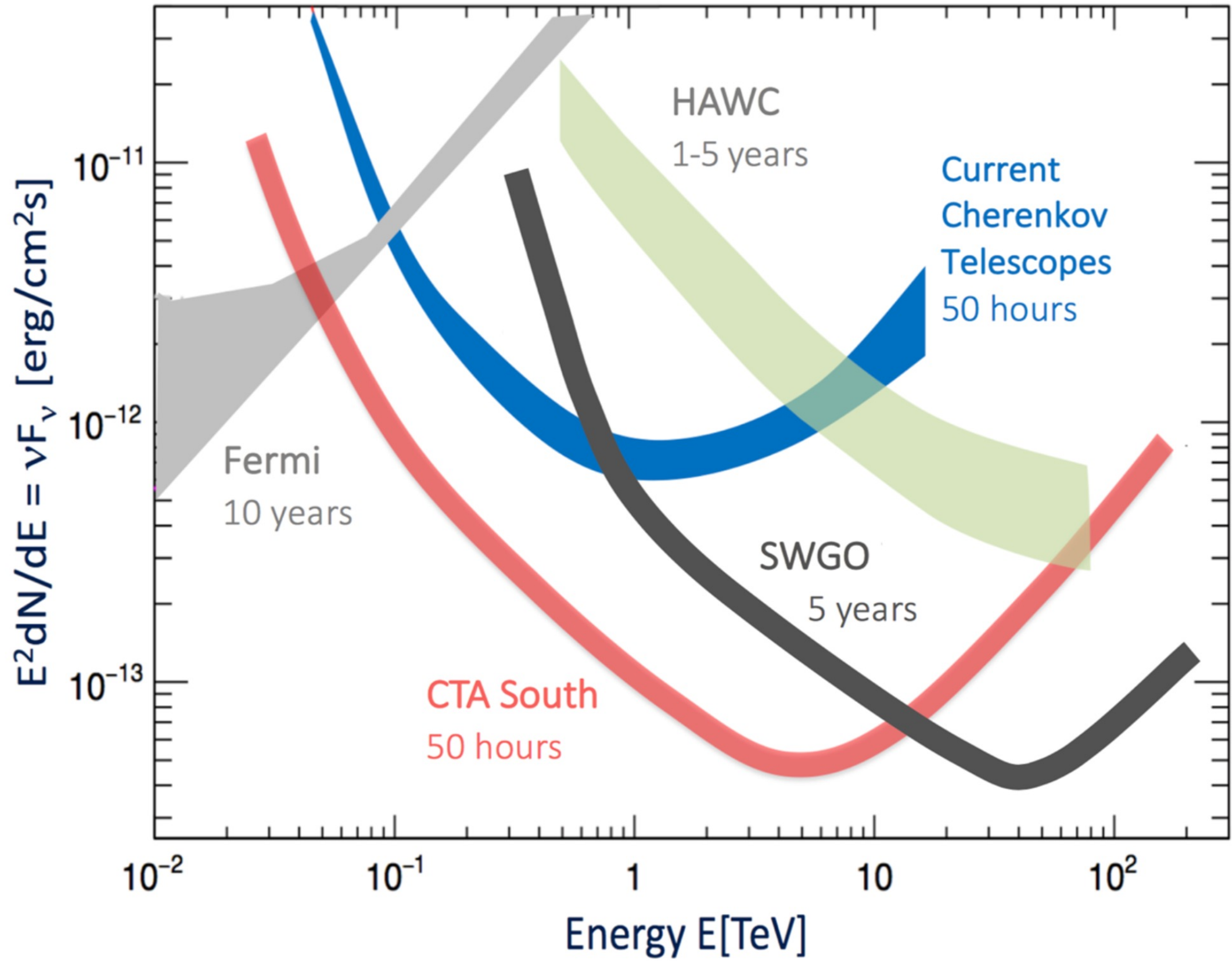
Site candidates being considered in:

- Argentina
- Bolivia
- Chile
- Peru

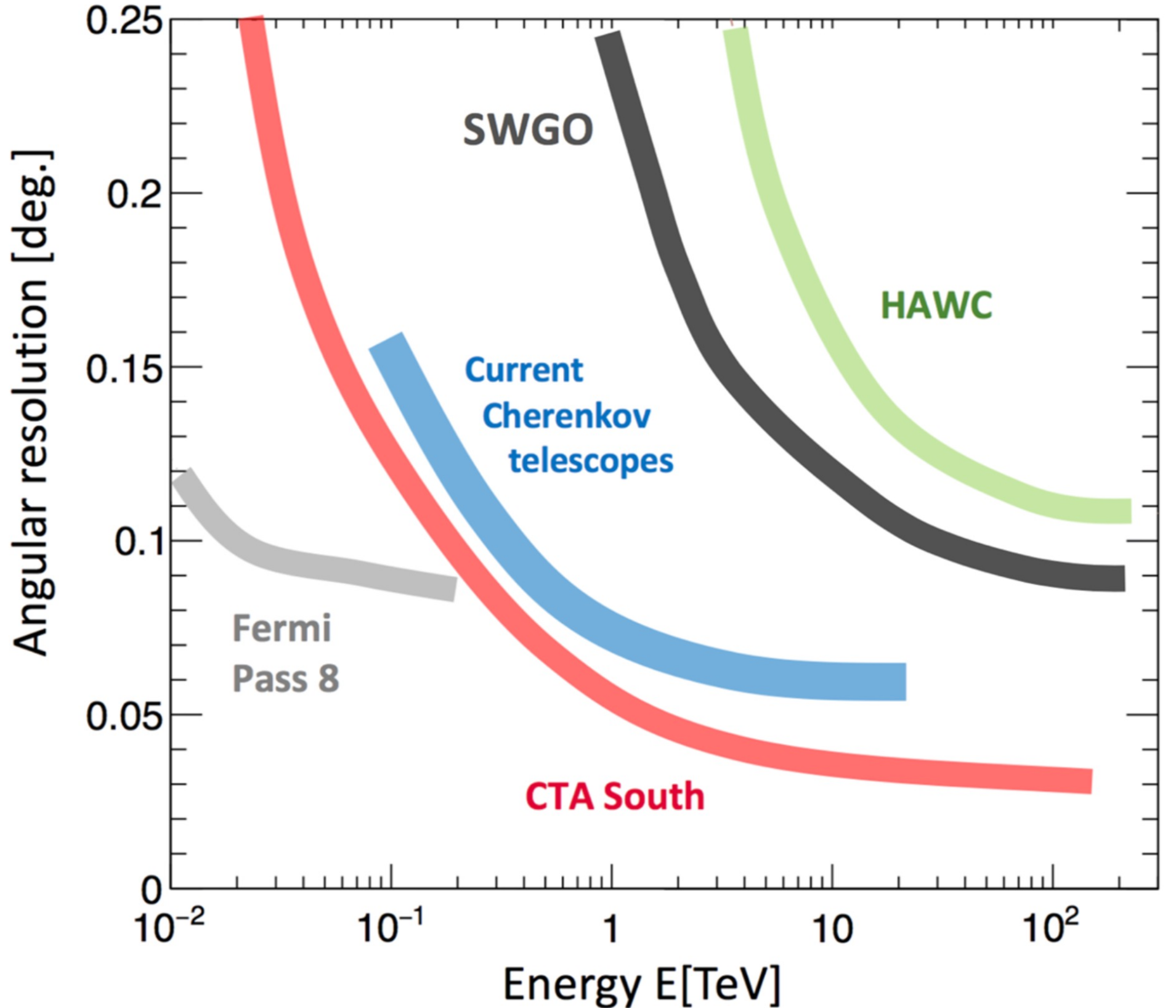


## PERFORMANCE

Preliminary Sensitivity:



Preliminary Resolution:



	IACT Arrays	Ground-particle Arrays
Field of view	3°–10°	90°
Duty cycle	10%–30%	>95%
Energy range	30 GeV – >100 TeV	~500 GeV – >100 TeV
Angular resolution	0.05°–0.02°	0.4°–0.1°
Energy resolution	~7%	60%–20%
Background rejection	>95%	90%–99.8%

## ACKNOWLEDGEMENTS

Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina; Agencia Nacional de Promoción de la Investigación, el Desarrollo Tecnológico y la Innovación (Agencia I+D+i), Argentina; Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), Brazil; Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ), Brazil; The Ministry of Education, Youth and Sports (MEYS), Czech Republic; Deutsche Forschungsgemeinschaft (DFG), Germany; Max-Planck-Gesellschaft (MPG), Germany; Ministry of Education, Universities and Research (MIUR), Italy; Consejo Nacional de Ciencia y Tecnología (CONACYT), Mexico; Universidad Nacional Autónoma de México (UNAM), Mexico; Fundação para a Ciência e a Tecnologia (Portugal); National Science Foundation (NSF), USA; The Laboratory Directed Research and Development (LDRD) program of Los Alamos National Laboratory, USA