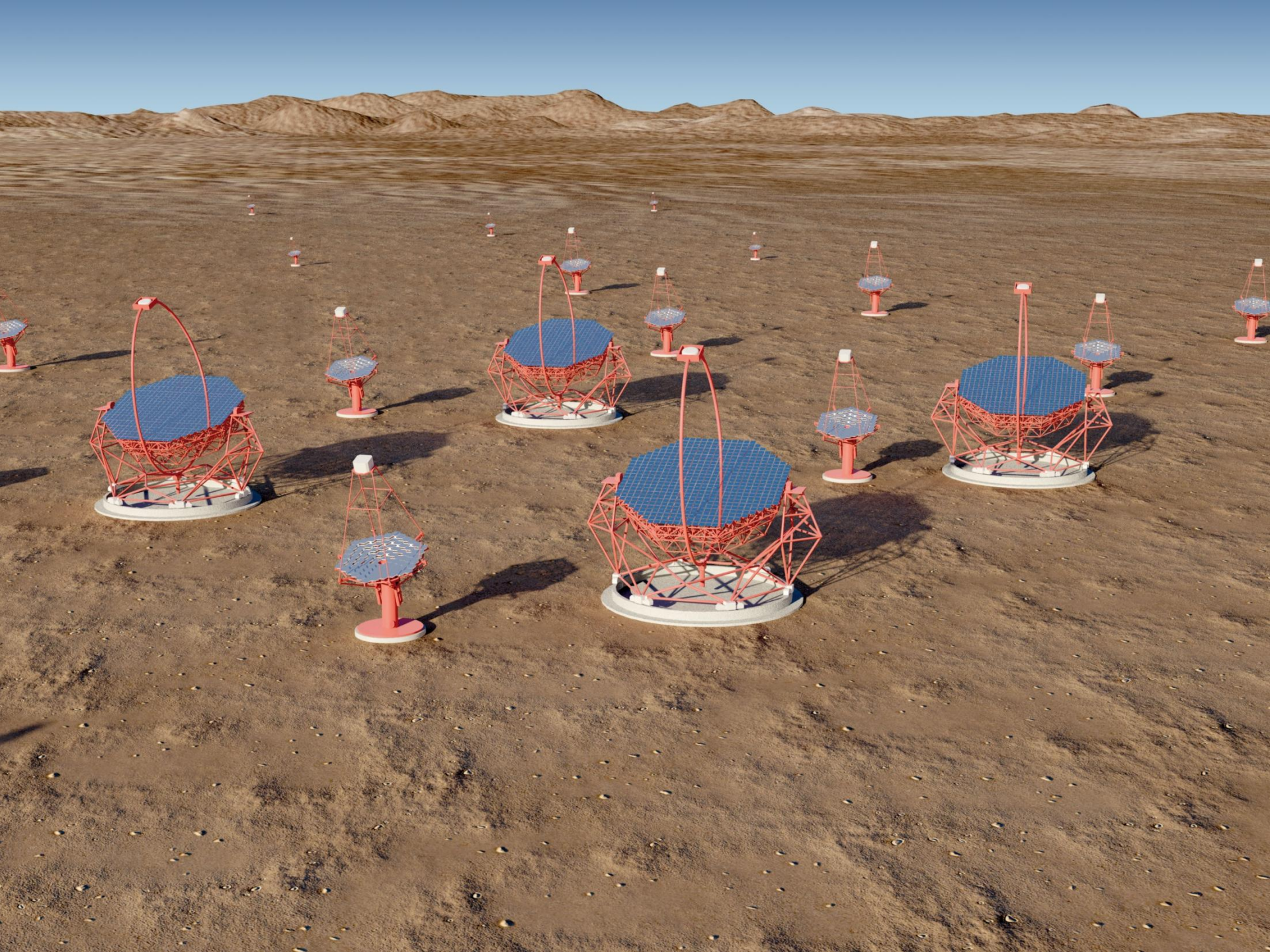
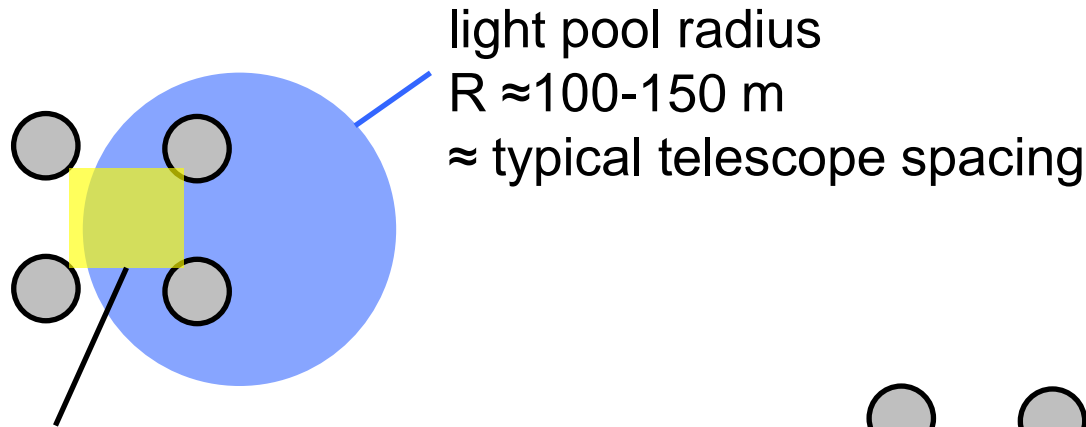


Patrizia Caraveo
INAF-IASF

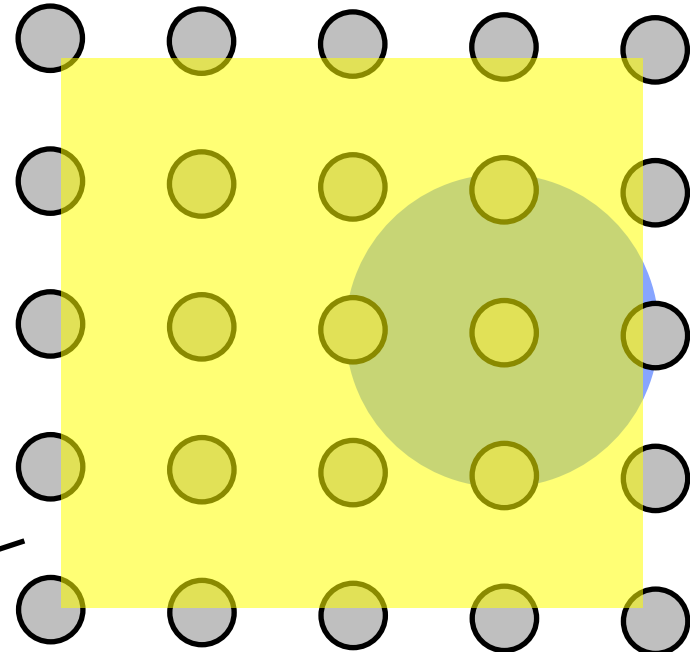


Why so many telescopes?



Sweet spot for best triggering and reconstruction:
most showers miss it!

large detection area
more images per shower
lower trigger threshold



CTA – A NEW WINDOW ONTO THE VIOLENT UNIVERSE

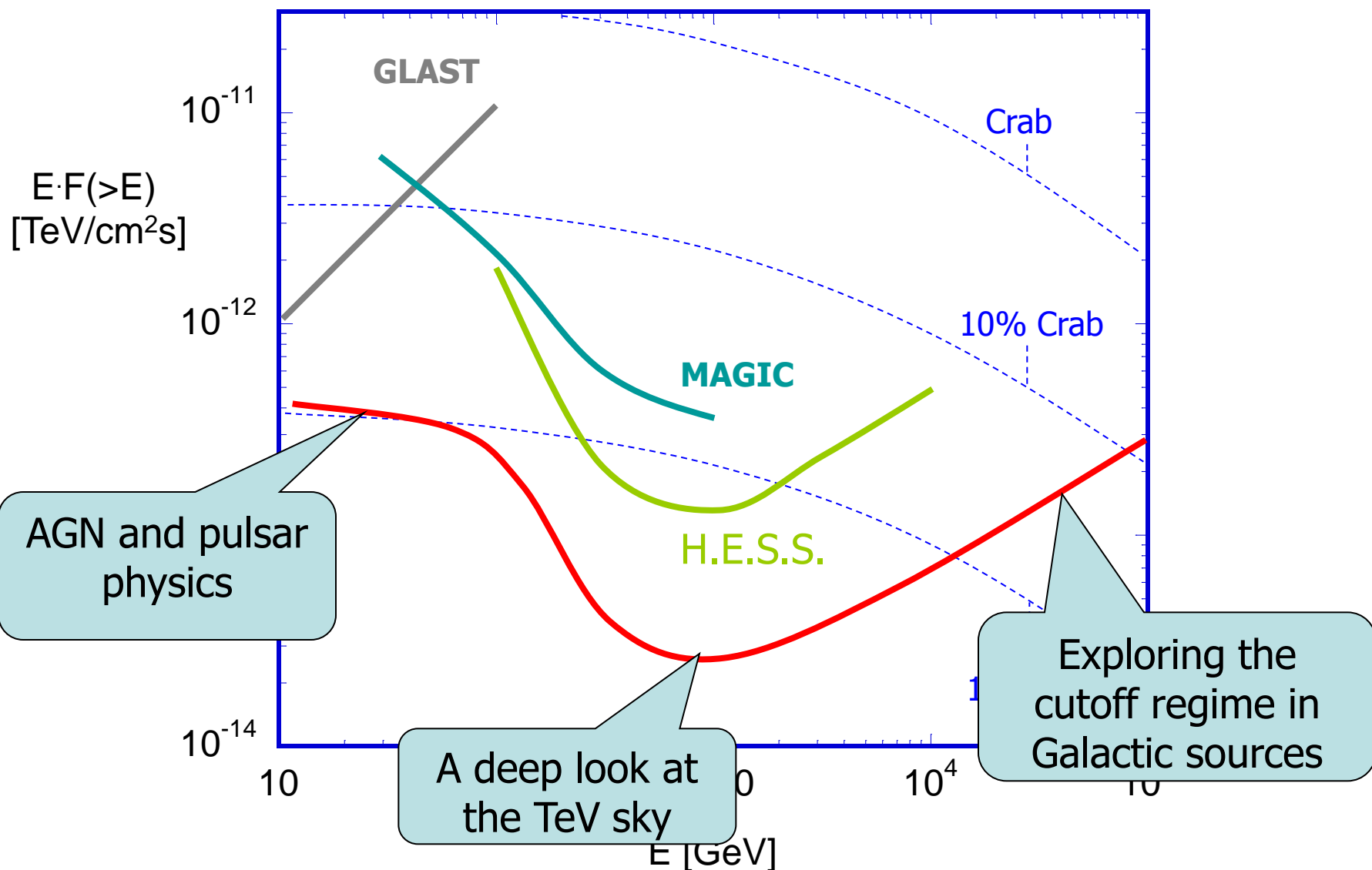


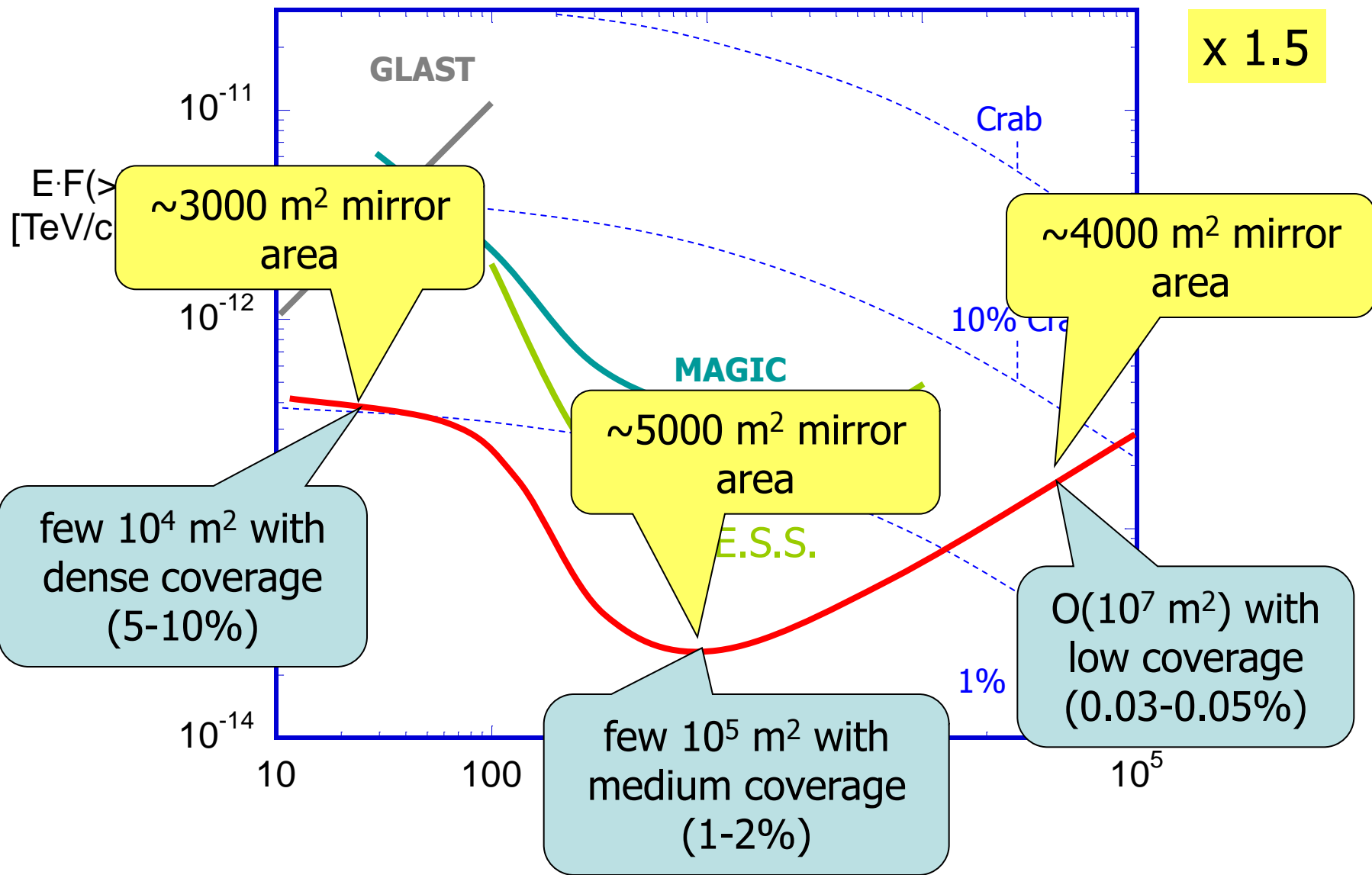
**Why are we planning an array of telescopes
of different sizes ?**

CTA

Possible CTA sensitivity

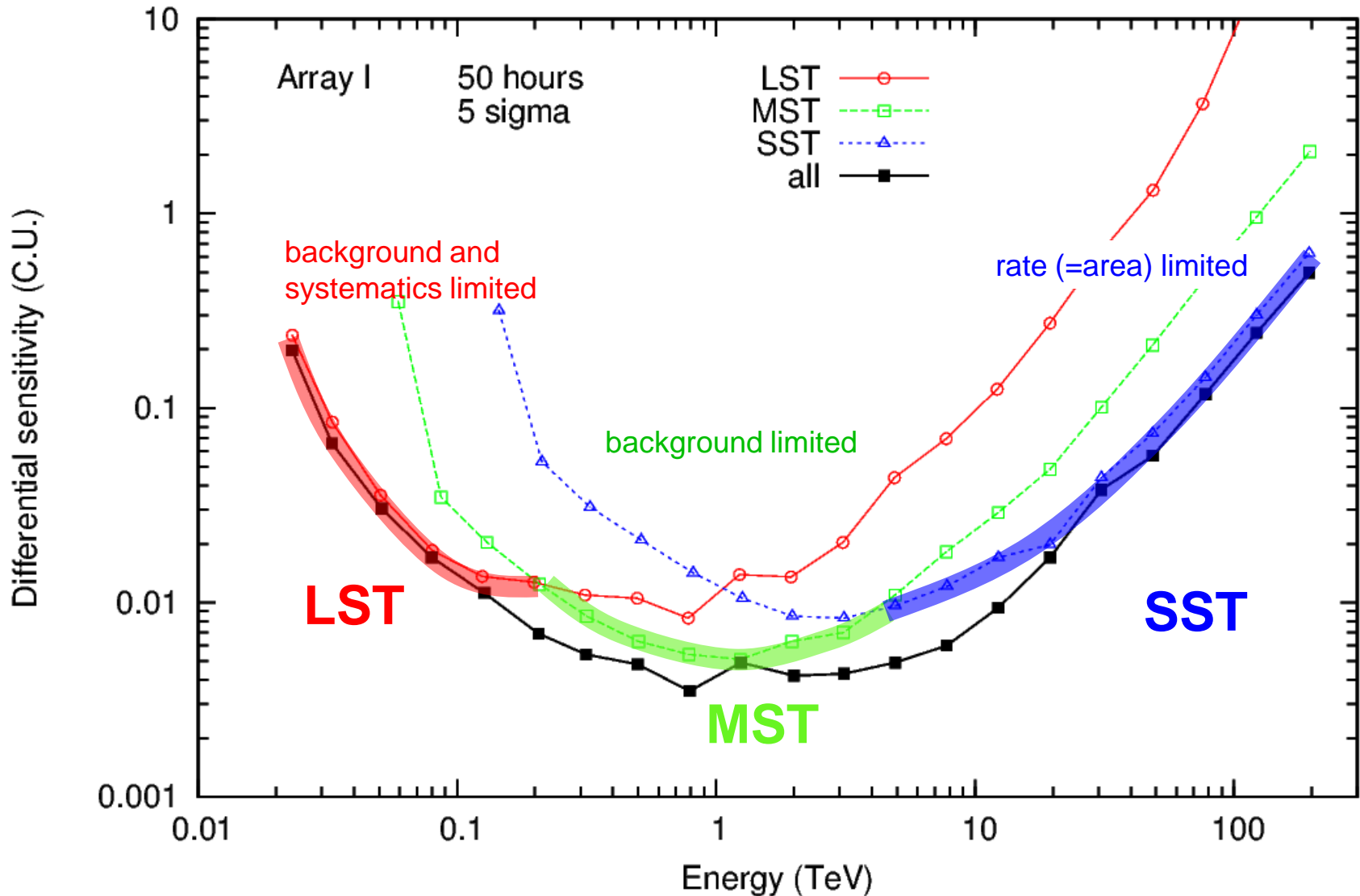
An advanced facility for ground-based high-energy gamma ray astronomy





Sensitivity (in units of Crab flux)

for detection in each 0.2-decade energy band



LARGE 23 M TELESCOPE

OPTIMIZED FOR THE RANGE BELOW 200 GEV



400 m² dish area
27.8 m focal length
1.5 m mirror facets

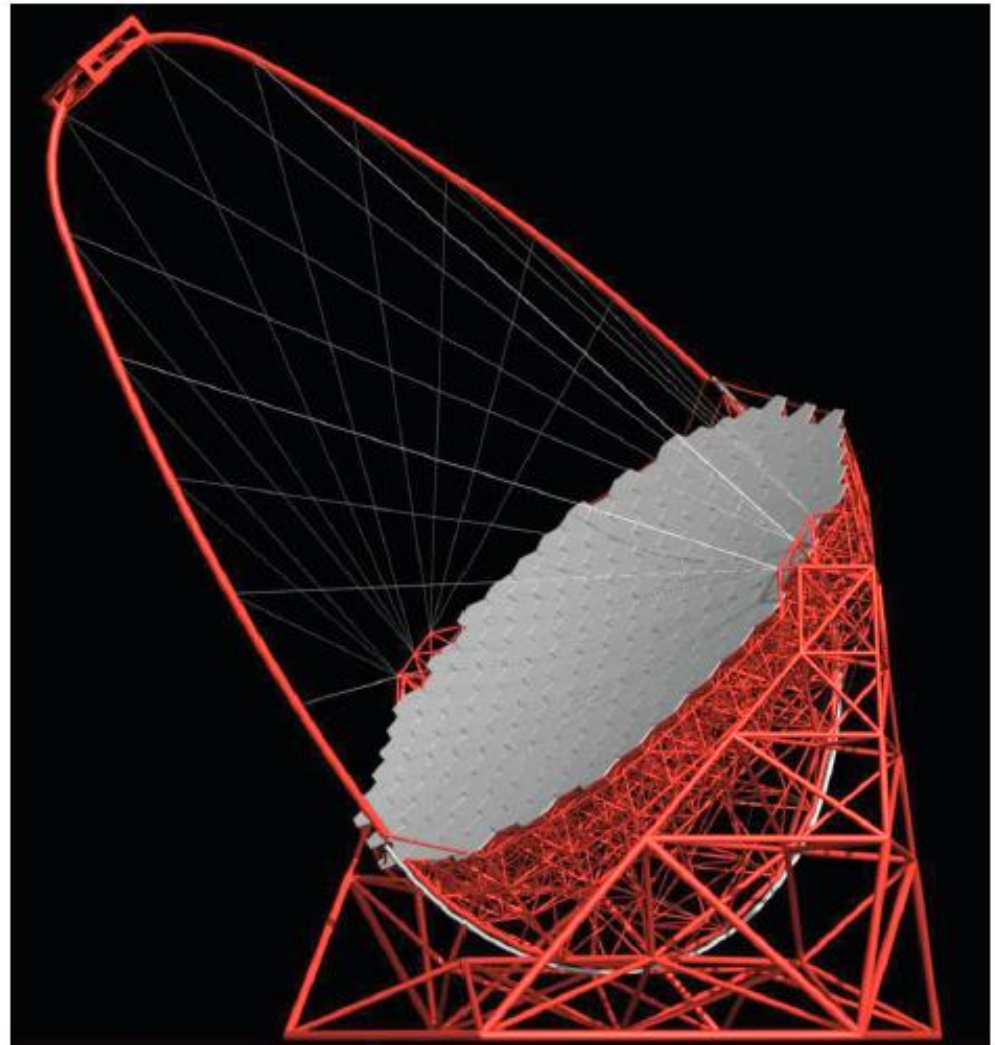
4.5° field of view
0.1° pixels
Camera Ø over 2 m

Carbon-fibre structure

Active damping
of oscillations,
active mirror control

4 LSTs on each site

→ Masahiro Teshima



MEDIUM-SIZED 12 M TELESCOPE

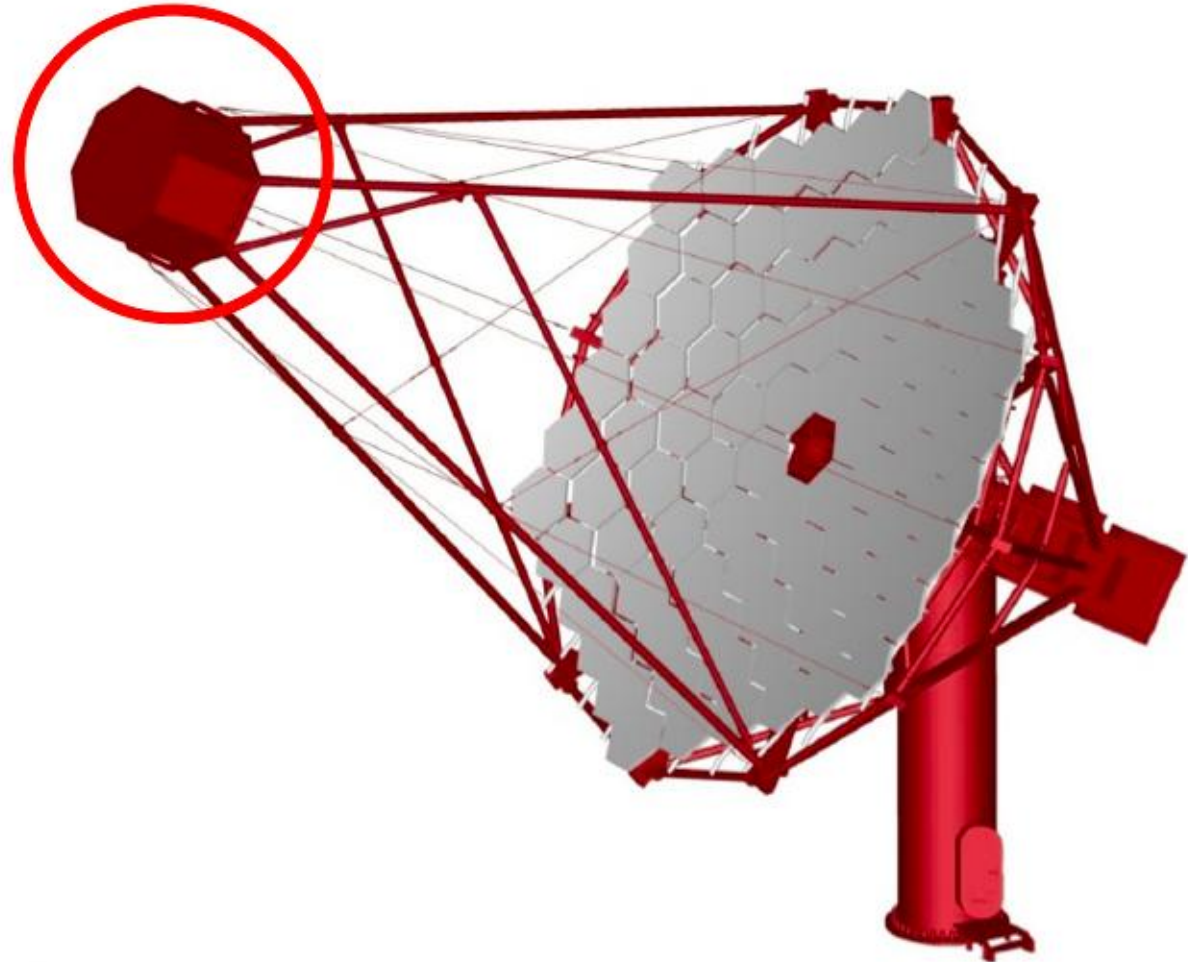
OPTIMIZED FOR THE 100 GEV TO ~10 TEV RANGE



100 m² dish area
16 m focal length
1.2 m mirror facets

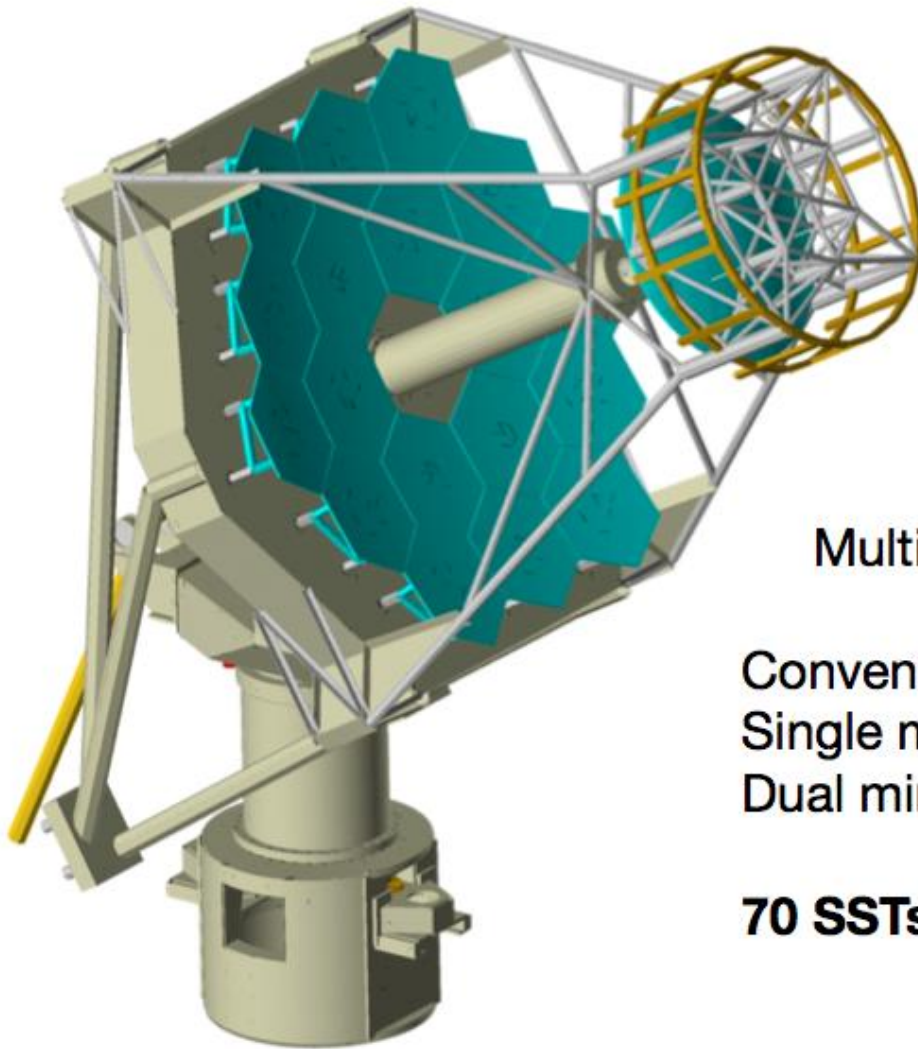
7-8° field of view
~2000 x 0.18° pixels

25 MSTs on South site
15 MSTs on North site



SMALL TELESCOPE

OPTIMIZED FOR THE RANGE ABOVE 10 TEV



ASTRI Design
4.3 m mirror
9.6° foV
0.25° pixels

Multiple options under study:

Conventional single mirror, PMT camera
Single mirror, silicon sensor camera
Dual mirror optics, silicon & MAPMT camera

70 SSTs on Southern site

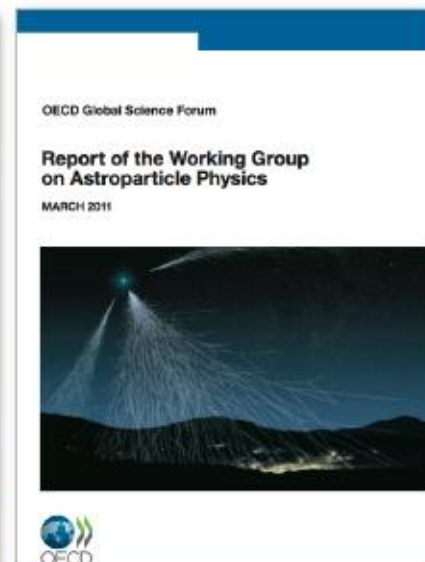
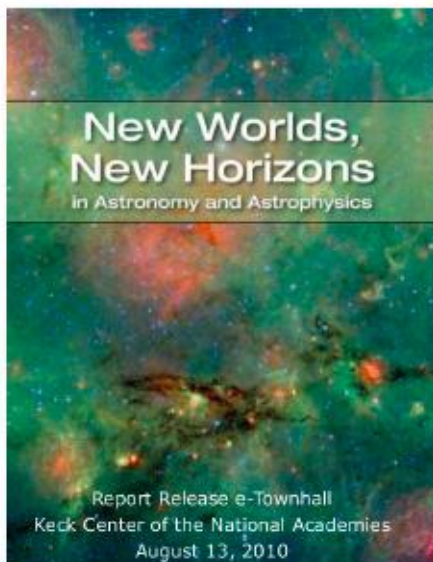
The future in very high energy gamma ray astronomy



- An Observatory open to the community
- Safe extrapolation of proven technologies, well-predictable performance
- Supported by a large and diverse community
- Highly ranked by major science roadmaps
- Currently in FP7-supported Preparatory Phase
- Aim for deployment over 5 years – 2014-2018



RECOMMENDED
BY NATIONAL AND
INTERNATIONAL
ROADMAPS ...



KEY SCIENCE ISSUES

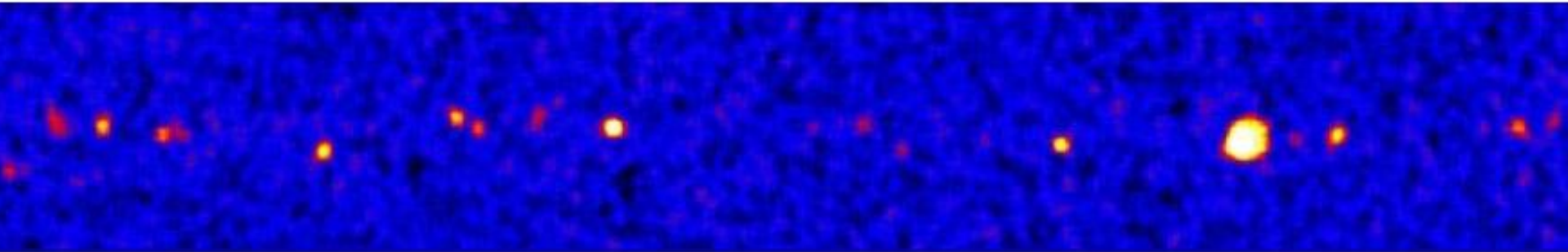


- Where and how are particles accelerated in our Galaxy and beyond?
- What makes black holes of all sizes such efficient particle accelerators?
- What do high-energy gamma-rays tell us about the star formation history of the Universe or the fundamental laws of physics?
- What is the nature of dark matter?
- The flaring sky: short-timescale phenomena at very high energies?

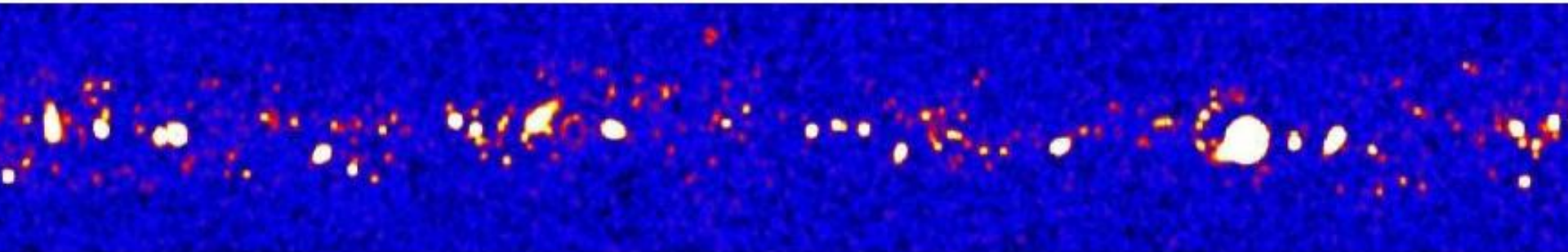
Example: Galactic Plane Survey



H.E.S.S.



CTA, for same exposure



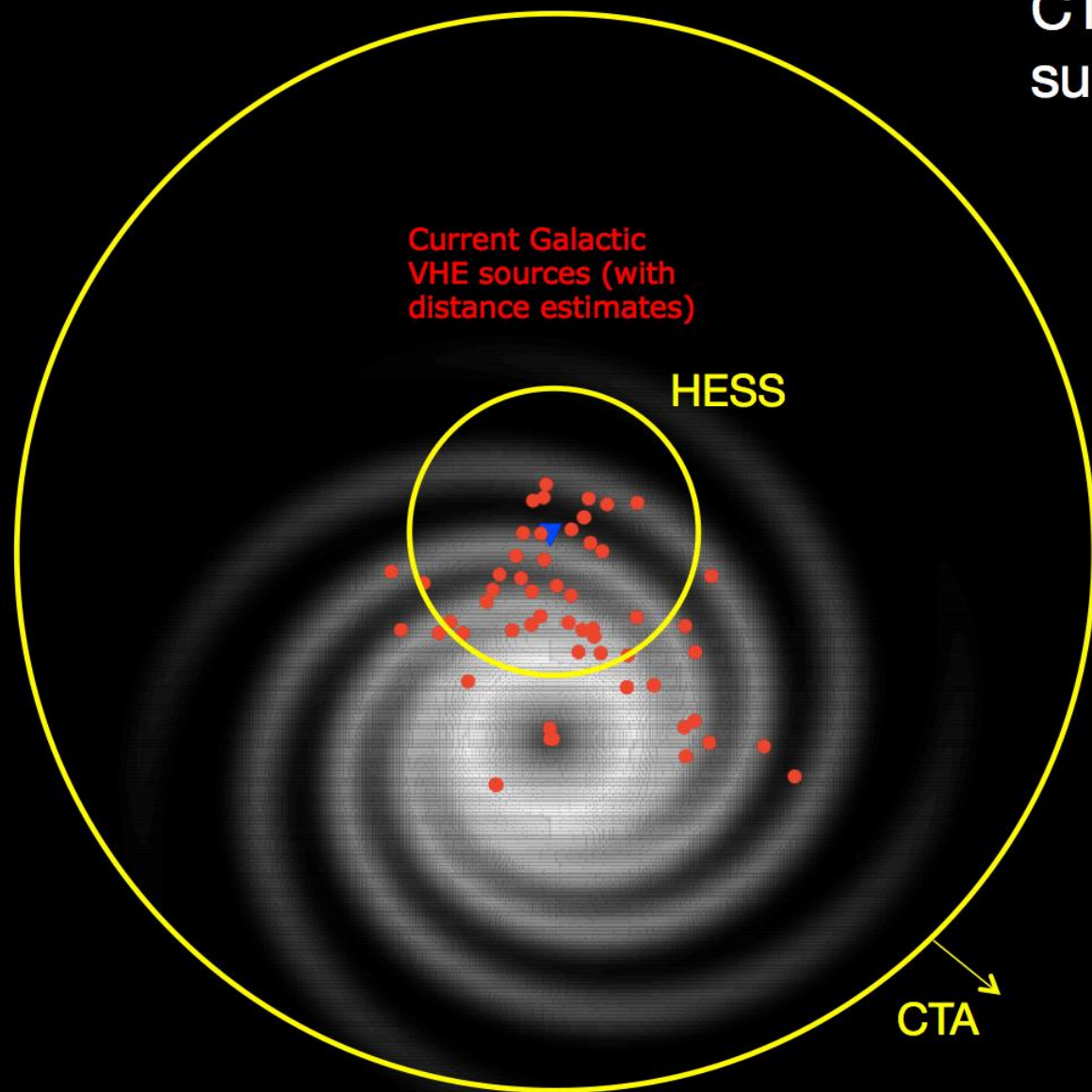
expect ~1000 detected sources

CTA as ultimate
survey machine

CTA as ultimate
flare machine

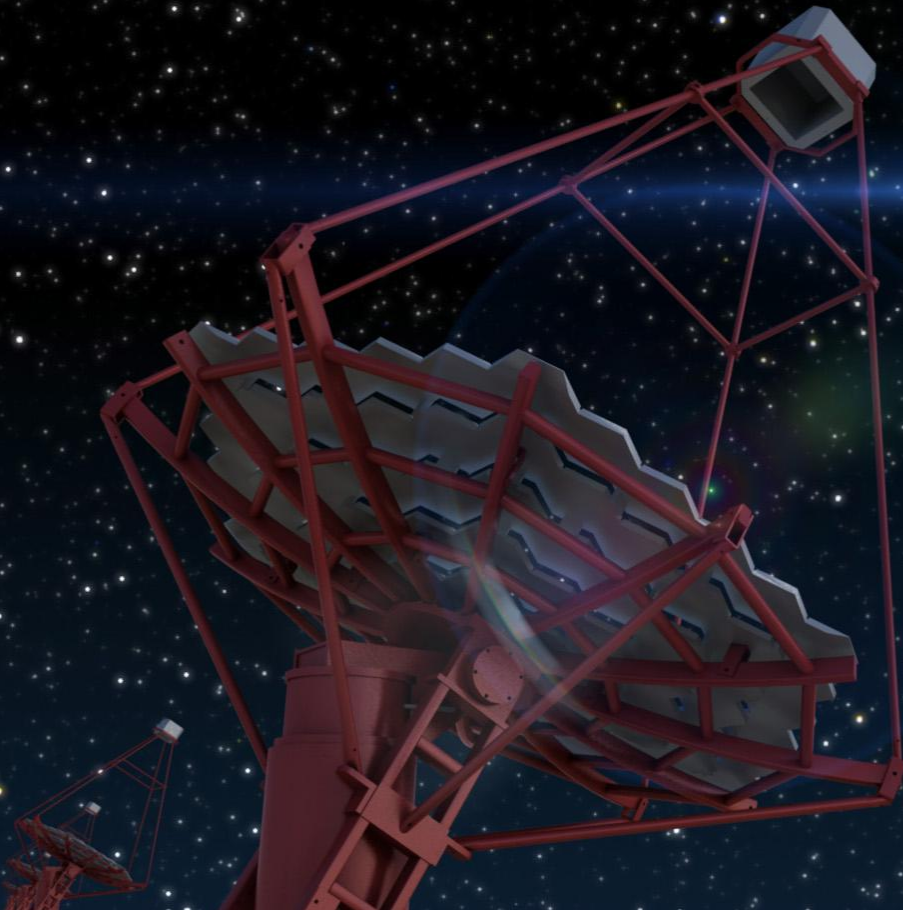
at 25 GeV, for flares
10000 times more
sensitive than Fermi

Coherent full-
sky coverage
from two sites



The deepest surveys of the skies at
the highest energies

The high energy variability at the
shortest time scales



cta
cherenkov telescope array

SITE CANDIDATES

Working towards quantifying site-dependent differences in performance and cost



by whom ?

COMMUNITY

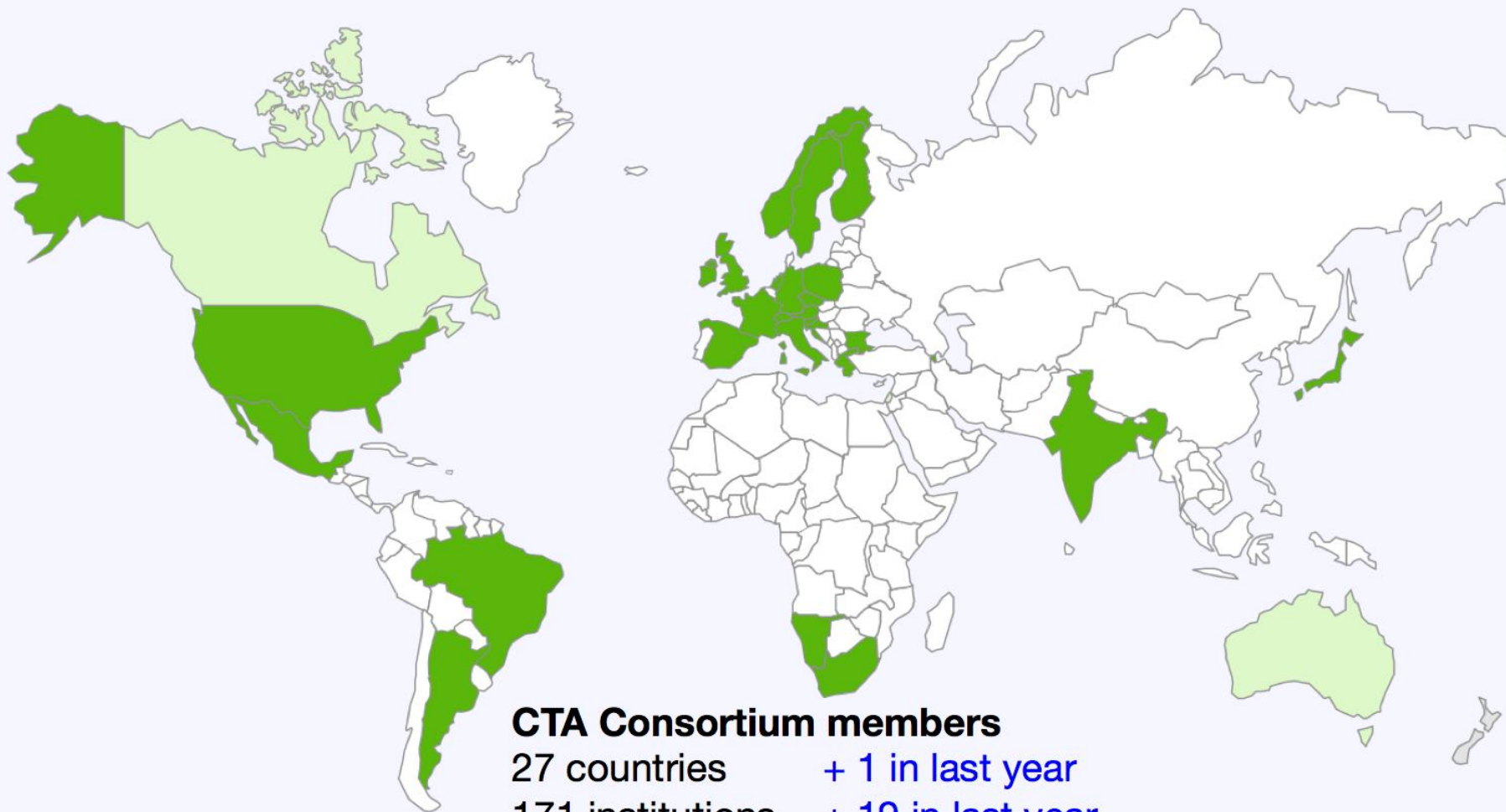
CURRENTLY ENGAGED IN CTA

(subset of future user community)

■ Members (27 countries)

■ interested to join

Canada, Australia, Israel



CTA Consortium members

27 countries

+ 1 in last year

171 institutions

+ 19 in last year

1058 persons

+ 198 in last year

TELESCOPES

	SST "small"	MST "medium"	LST "large"	SCT "medium 2-M"
Number	70 (S)	25 (S) 15 (N)	4 (S) 4 (N)	36 (S)
Spec'd range	> few TeV	200 GeV to 10 TeV	20 GeV to 1 TeV	200 GeV to 10 TeV
Eff. mirror area	> 5 m ²	> 88 m ²	> 330 m ²	> 40 m ²
Field of view	> 8°	> 7°	> 4.4°	> 7°
Pixel size ~PSF θ_{80}	< 0.25°	< 0.18°	< 0.11°	< 0.075°
Positioning time	90 s, 60 s goal	90 s, 60 s goal	50 s, 20 s goal	90 s, 60 s goal
Availability	> 97% @ 3 h/week	>97% @ 6 h/week	>95% @ 9 h/week	>97% @ 6 h/week
Target capital cost	420 k€	1.6 M€	7.4 M€	2.0 M€

CTA TIMELINE

“By signing this Declaration of Intent, the signatories – Ministries and Funding Agencies – wish to express their common interest in participating in the construction and operation of CTA.”



So far signed by

Argentina	Japan
Austria	Namibia
Brazil	Poland
France	South Africa
Germany	Spain
Italy	Switzerland
	UK

SCIENCE DEFINITION



Seeing the High-Energy Universe with the Cherenkov Telescope Array - The Science Explored with the CTA

Special issue of “Astroparticle Physics”
in press

Overview articles &
case studies

350+ pages

