





# The Cherenkov Telescope Array And GAMMA-400

**Oscar Blanch Bigas**



# The Future in VHE $\gamma$ -ray astronomy

171 institutes  
>1000 scientists

Members   
Interested 



**Two sites (North / South)**  
**Operated as open observatory**

**10 fold sensitivity of current instruments**  
**10 fold energy range**  
**Improved angular resolution**

# Status and plans

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Design study phase concluded in Fall 2010

Design Concepts for the Cherenkov Telescope Array

FP7-supported Preparatory Phase: Fall 2010 – Fall 2013

Technical design, sites, construction and operation cost

Small + medium-sized telescope prototypes

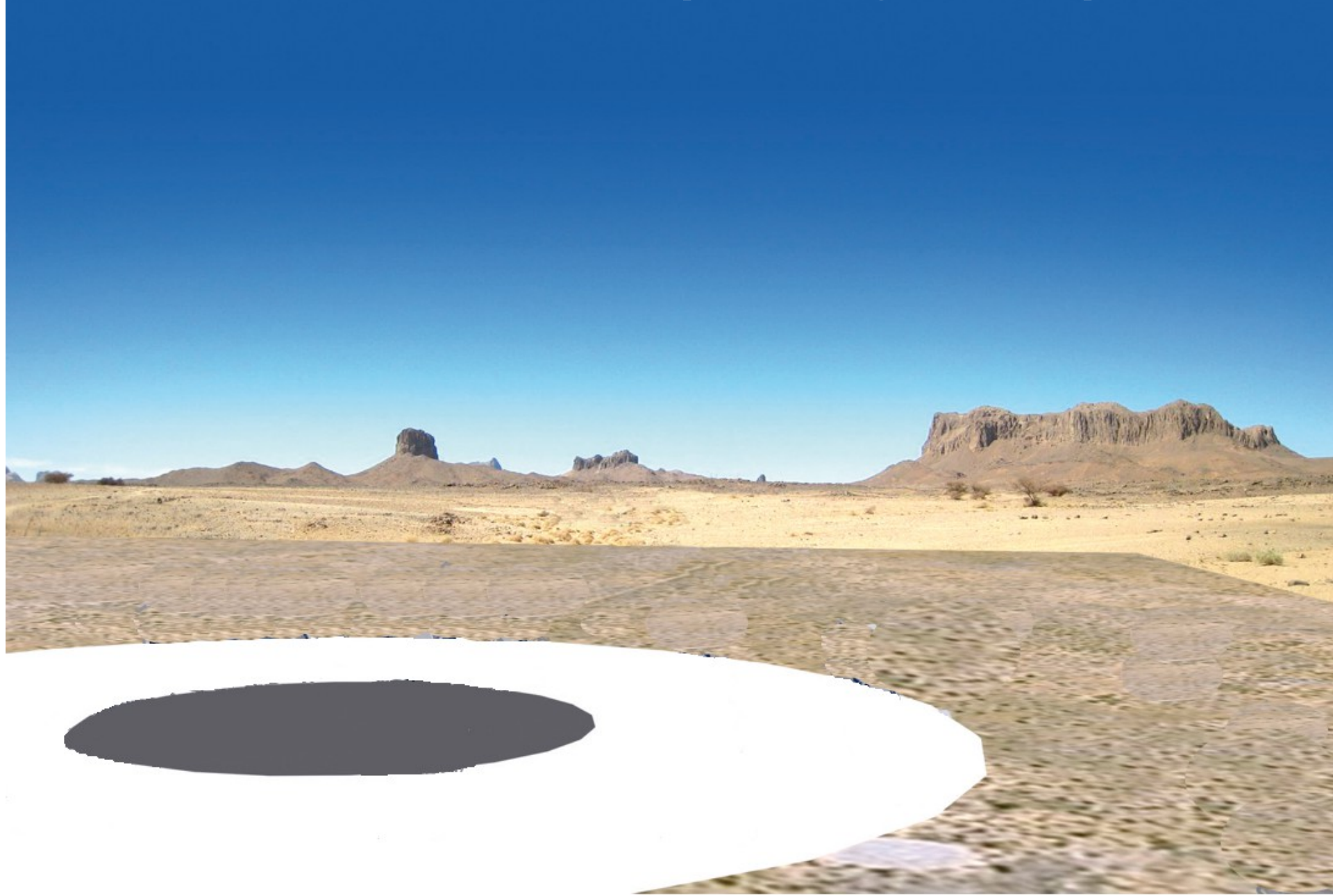
Legal, governance and finance schemes

*Extension requested until Summer 2014*

Aim for:

- Site decision in about two weeks
- Start of site development almost starting
- Deployment starts ... 2016 for first LST in La Palma
- Base arrays complete in ~2020

# The Cherenkov Telescope Array concept



# The Cherenkov Telescope Array concept

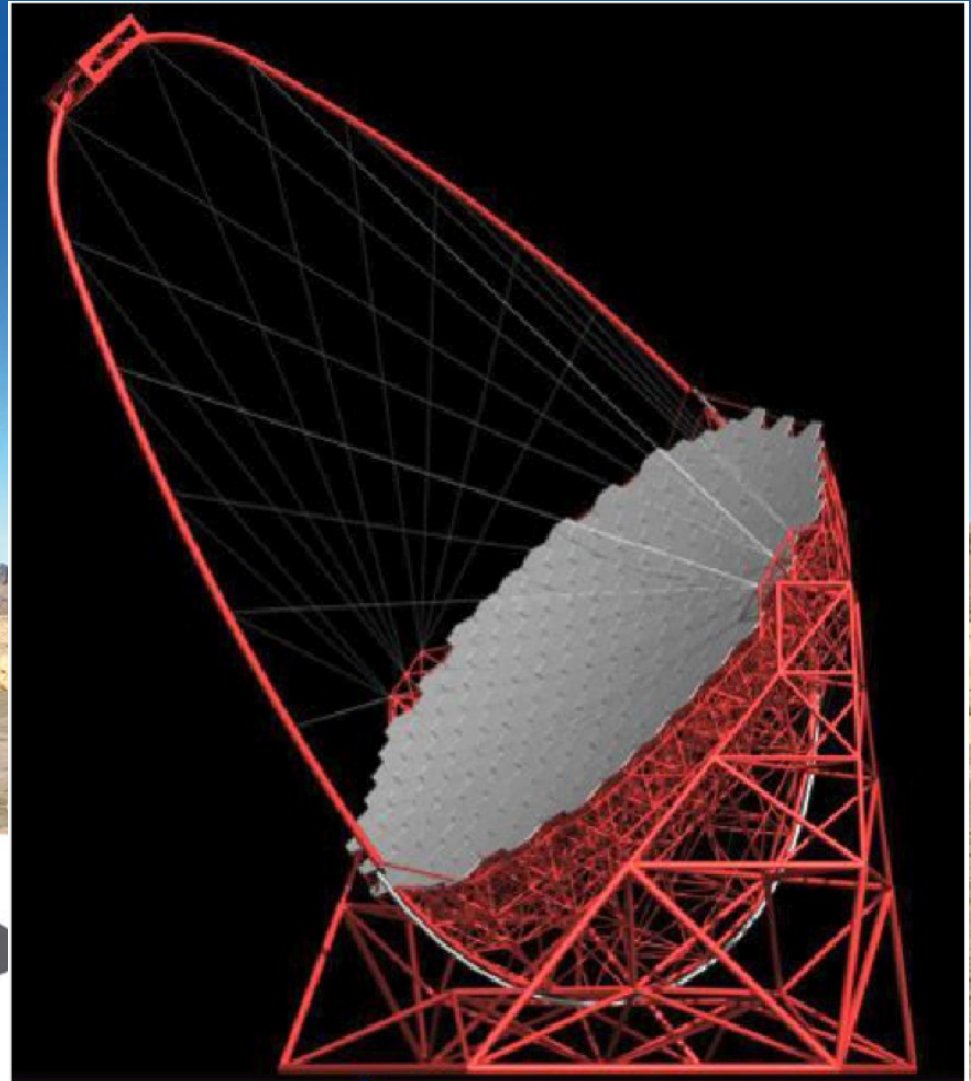
Low energy

Few 23 m telescopes

$4.5^\circ$  FoV

~2000 pixels

~  $0.1^\circ$



# The Cherenkov Telescope Array concept

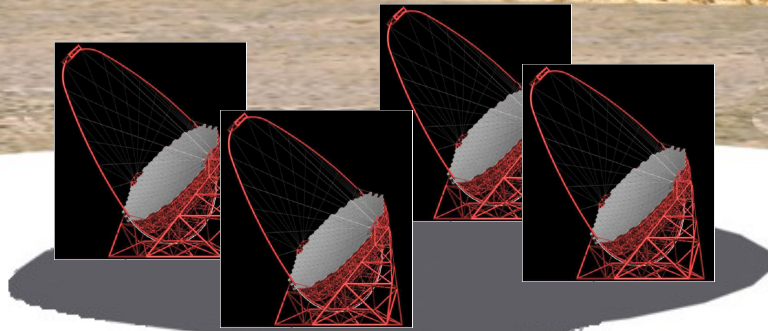
Low energy

Few 23 m telescopes

4.5° FoV

~2000 pixels

~ 0.1°



# The Cherenkov Telescope Array concept

Medium energy

About twenty 12 m telescopes

$\sim 8^\circ$  FoV

$\sim 2000$  pixels

$\sim 0.2^\circ$



# The Cherenkov Telescope Array concept

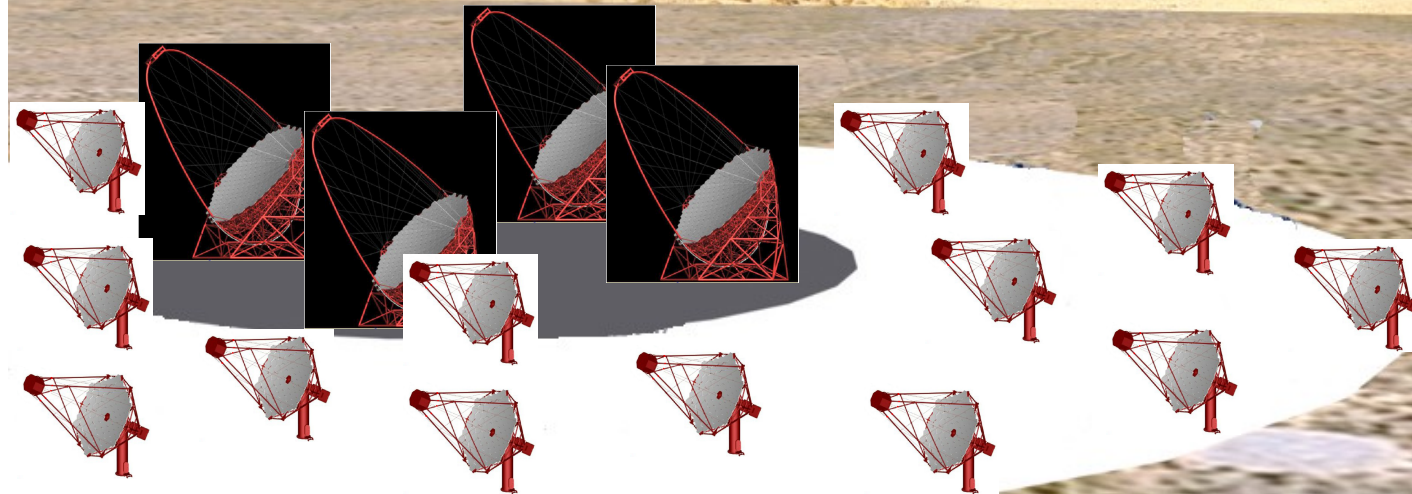
Medium energy

About twenty 12 m telescopes

$\sim 8^\circ$  FoV

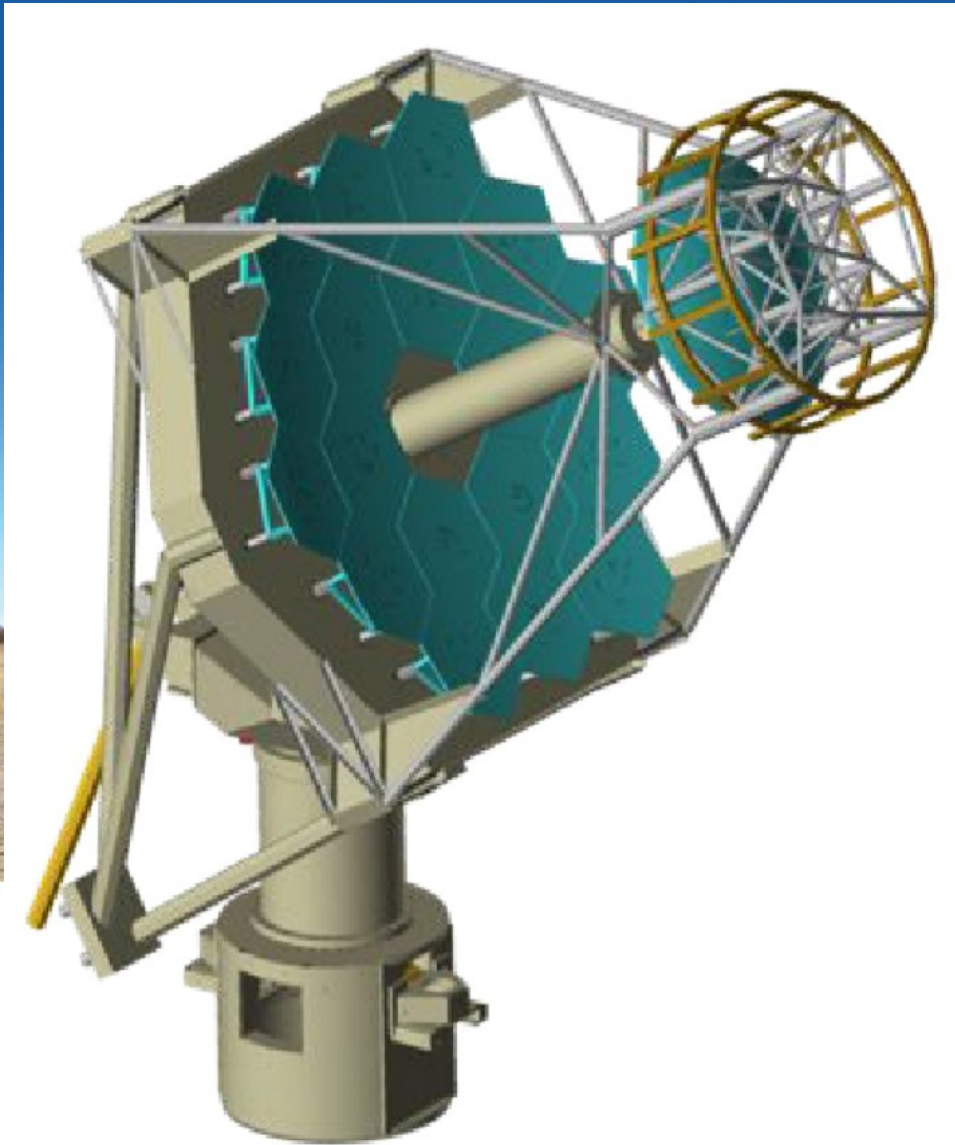
$\sim 2000$  pixels

$\sim 0.2^\circ$





# The Cherenkov Telescope Array concept



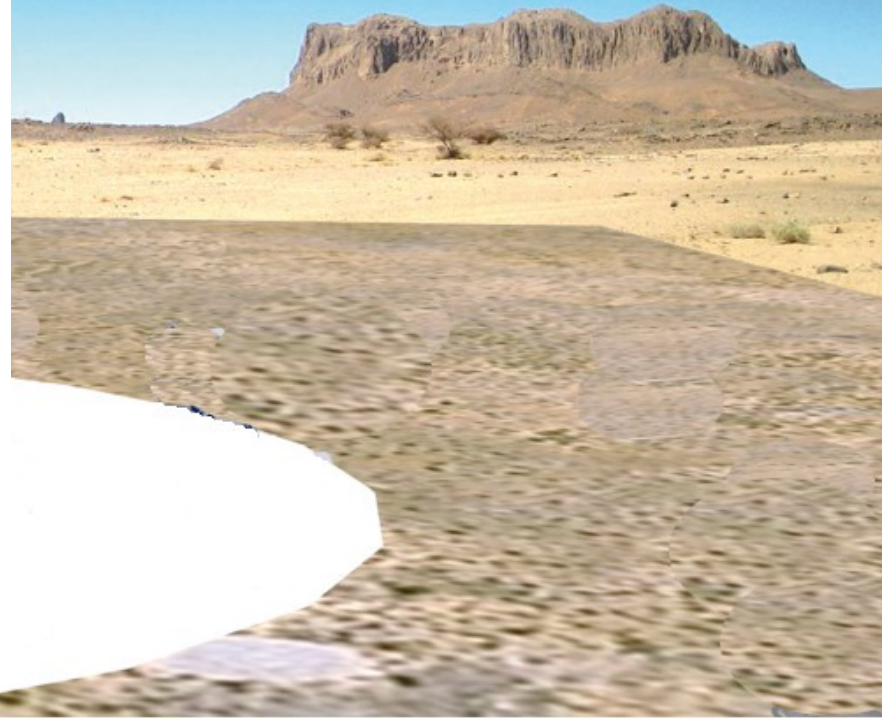
High energy

Fifty + 4.3 m telescopes

9.6° FoV

Compact Silicon Camera

~ 0.25



# The Cherenkov Telescope Array concept

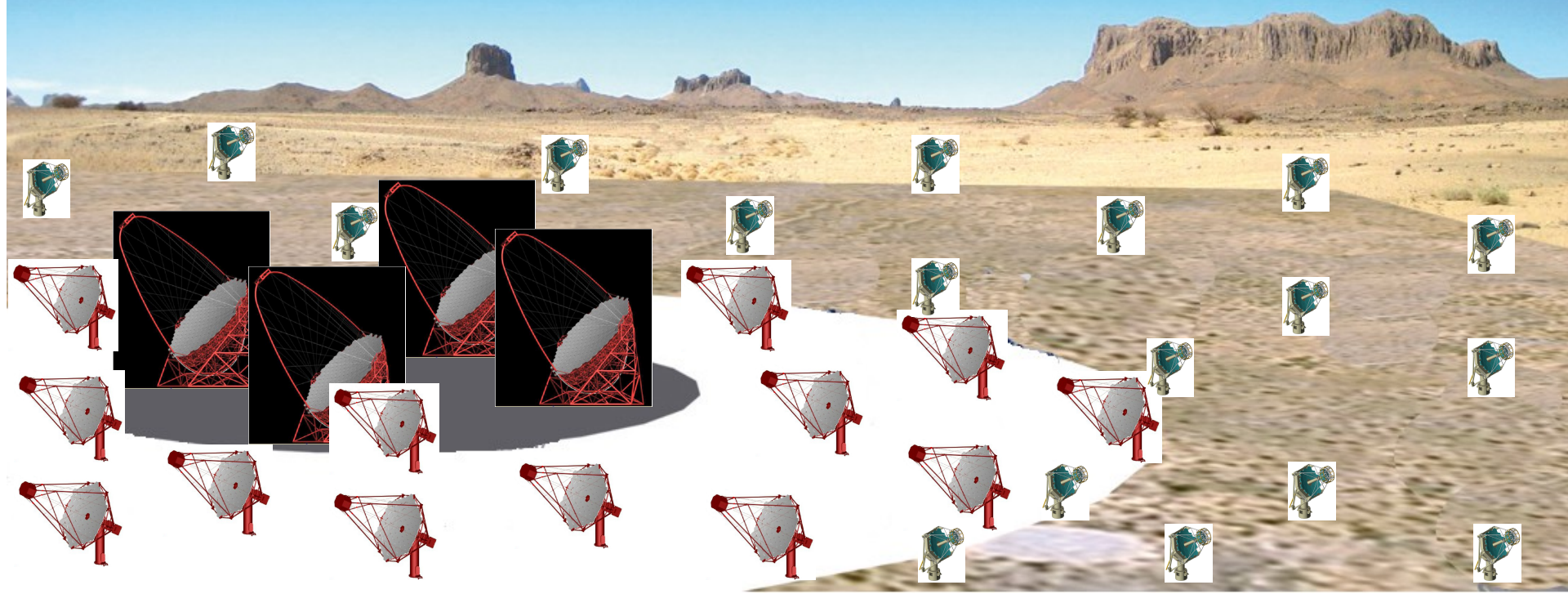
High energy

Fifty + 4.3 m telescopes

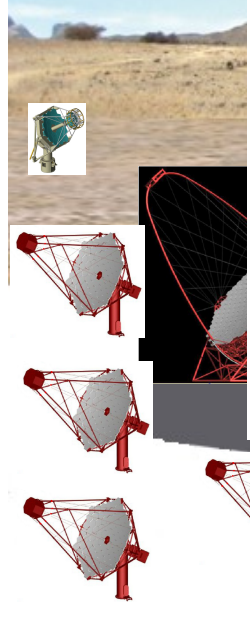
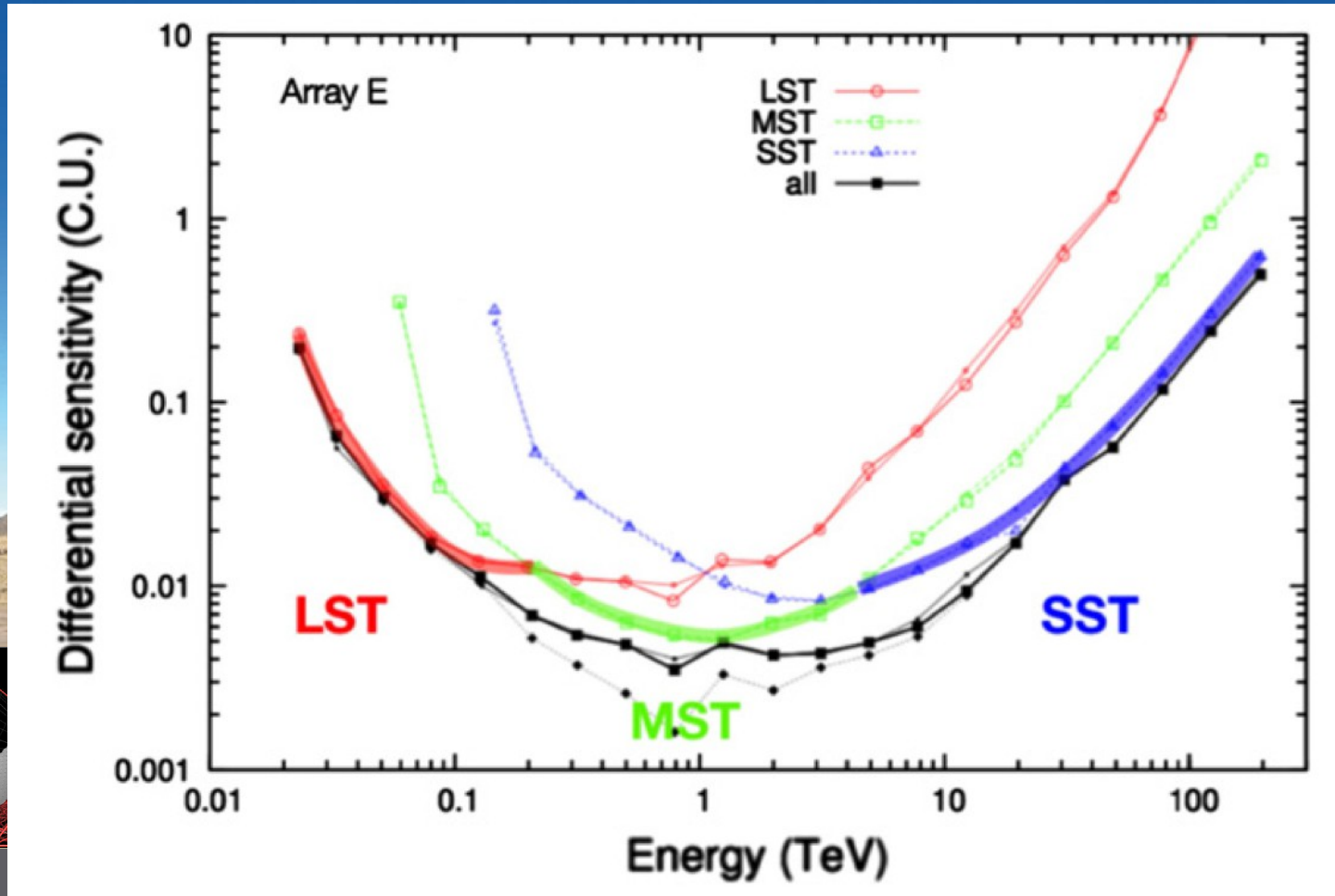
9.6° FoV

Compact Silicon Camera

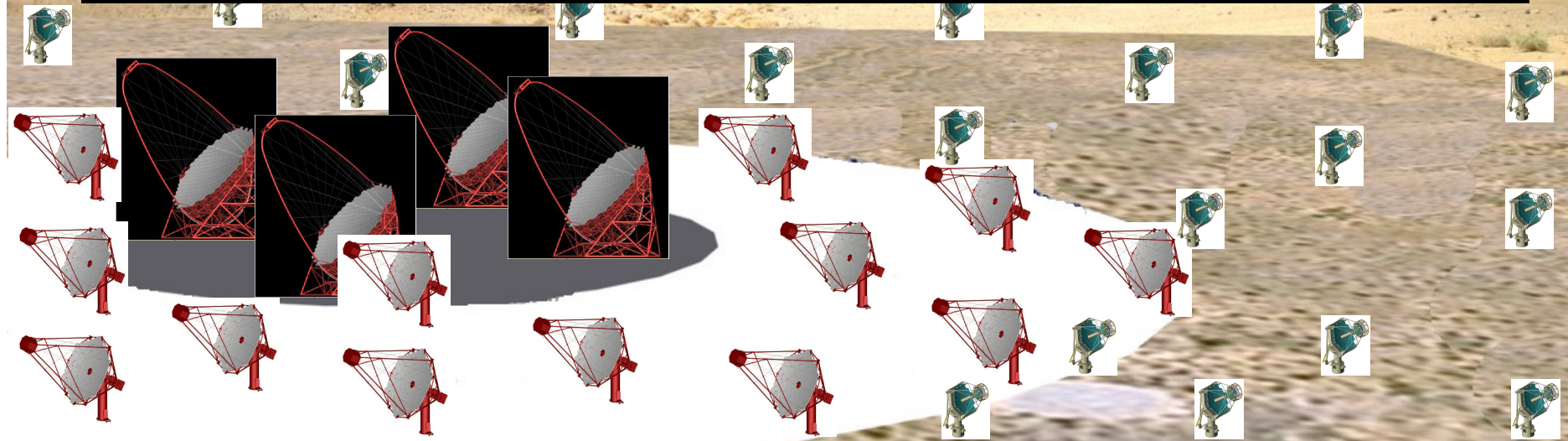
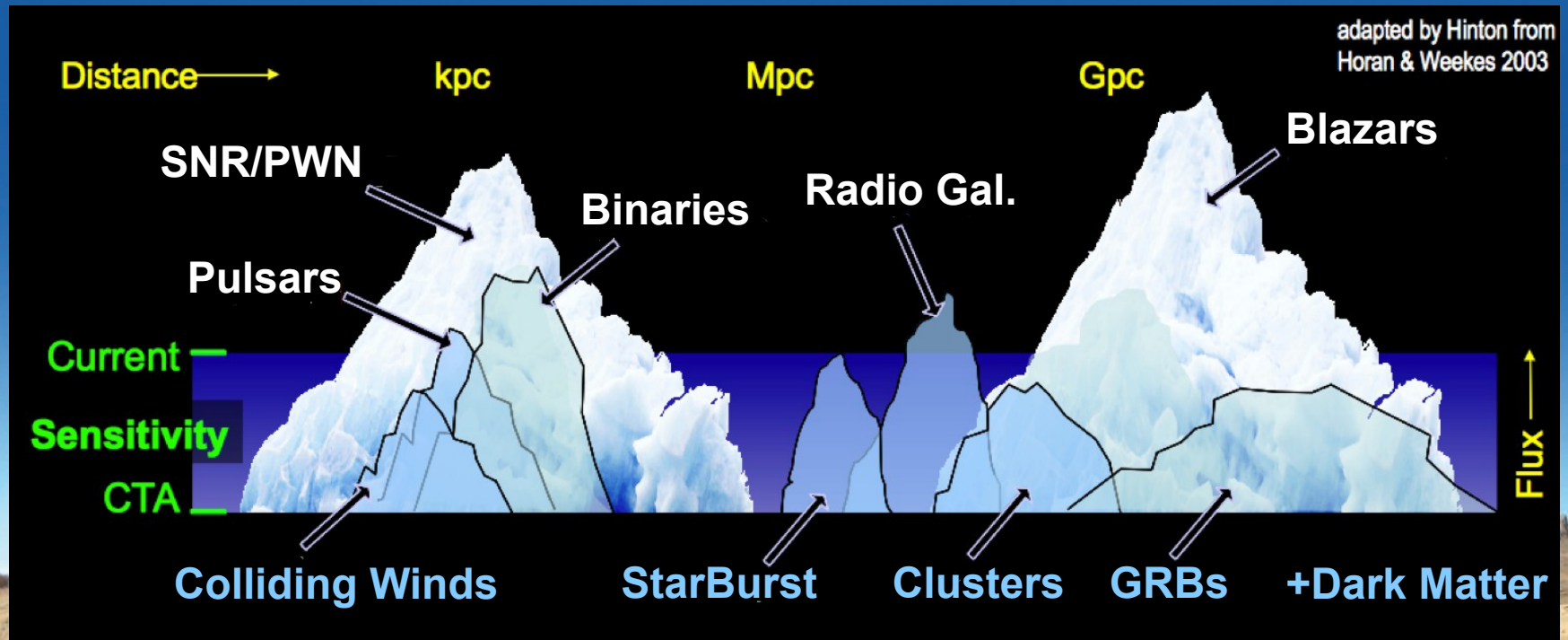
~ 0.25



# The Cherenkov Telescope Array concept



# The Cherenkov Telescope Array concept



# The Cherenkov Telescope Array concept

Data from CTA can also provide information on fundamental physics:

- Indirect Detection of Dark Matter
- Charged Particles Measurement
- Axion Like Particles
- Lorentz Invariance Violation
- Interaction of UHE Cosmic-Rays
- Extragalactic Background Light
- Cosmology

adapted by Hinton from

Blazars

Flux ↑

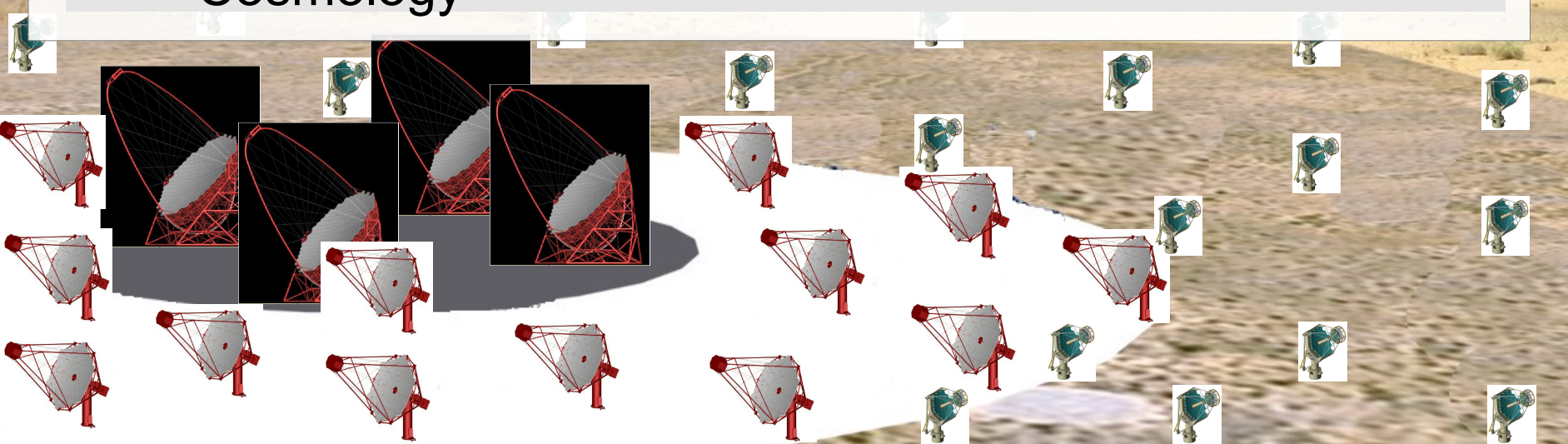
+Dark Matter

GRBs

Clusters

StarBurst

Colliding Winds

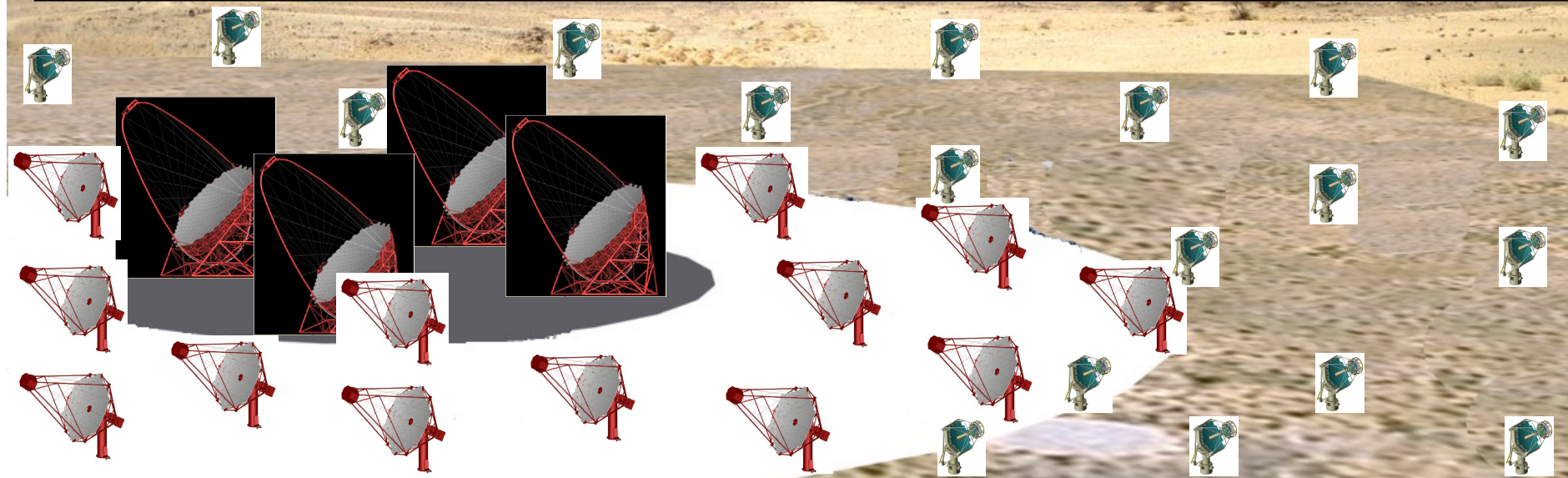


# The Cherenkov Telescope Array concept

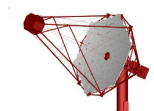
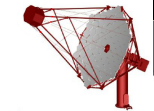
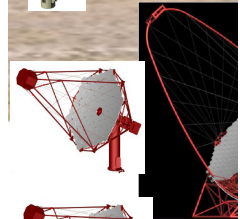
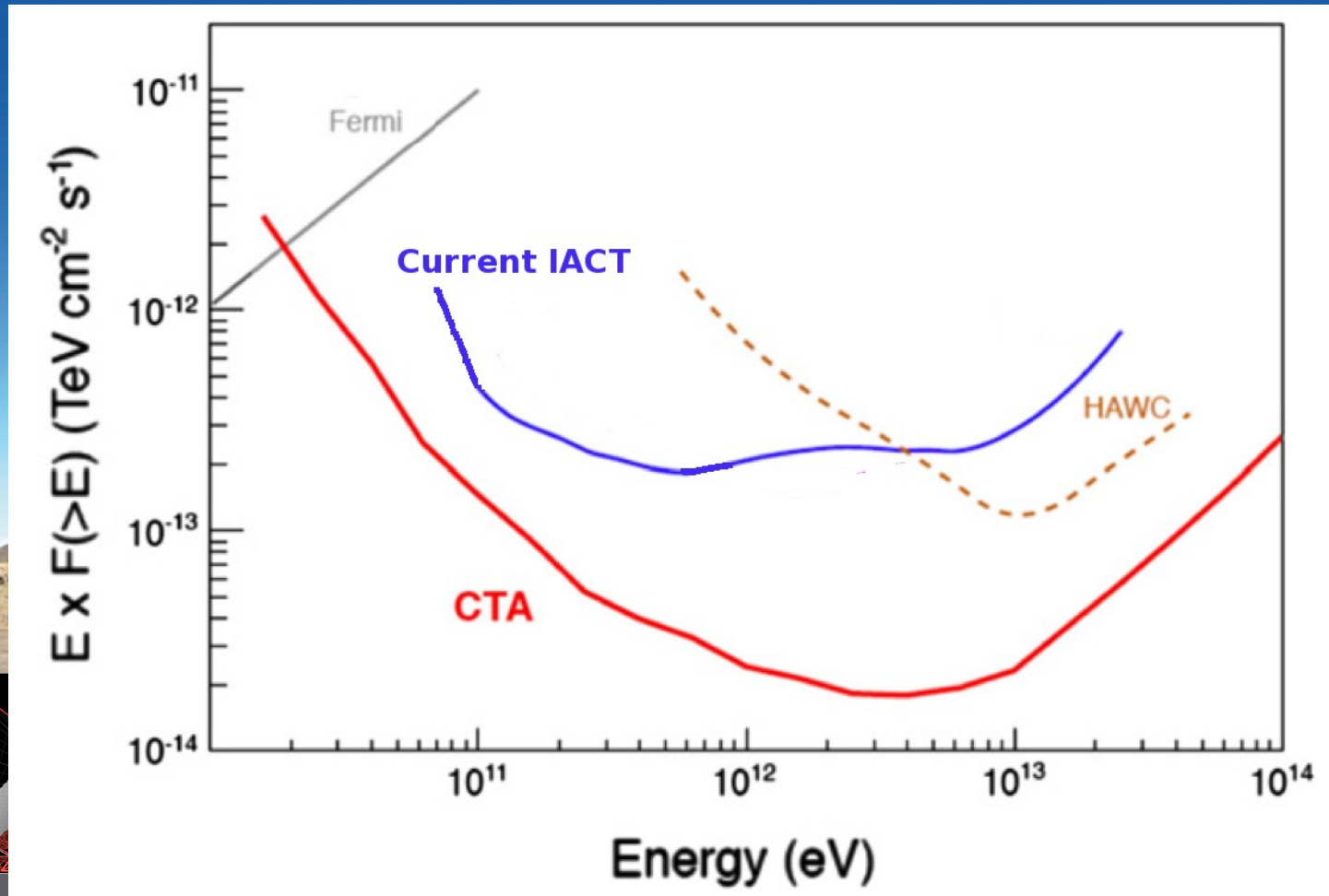
- Possibility to answer many questions still open both on Astro and Fundamental Physics.
- Some measurements will be complementary to other instruments
- But ... CTA is unique at least in:

**Short time scale phenomena at VHE**

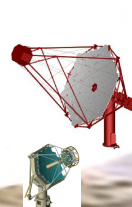
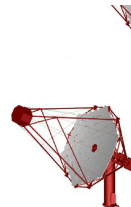
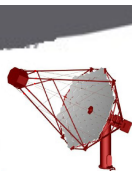
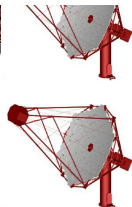
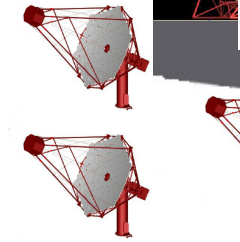
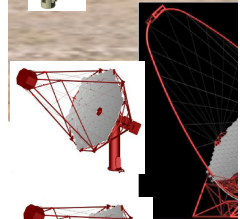
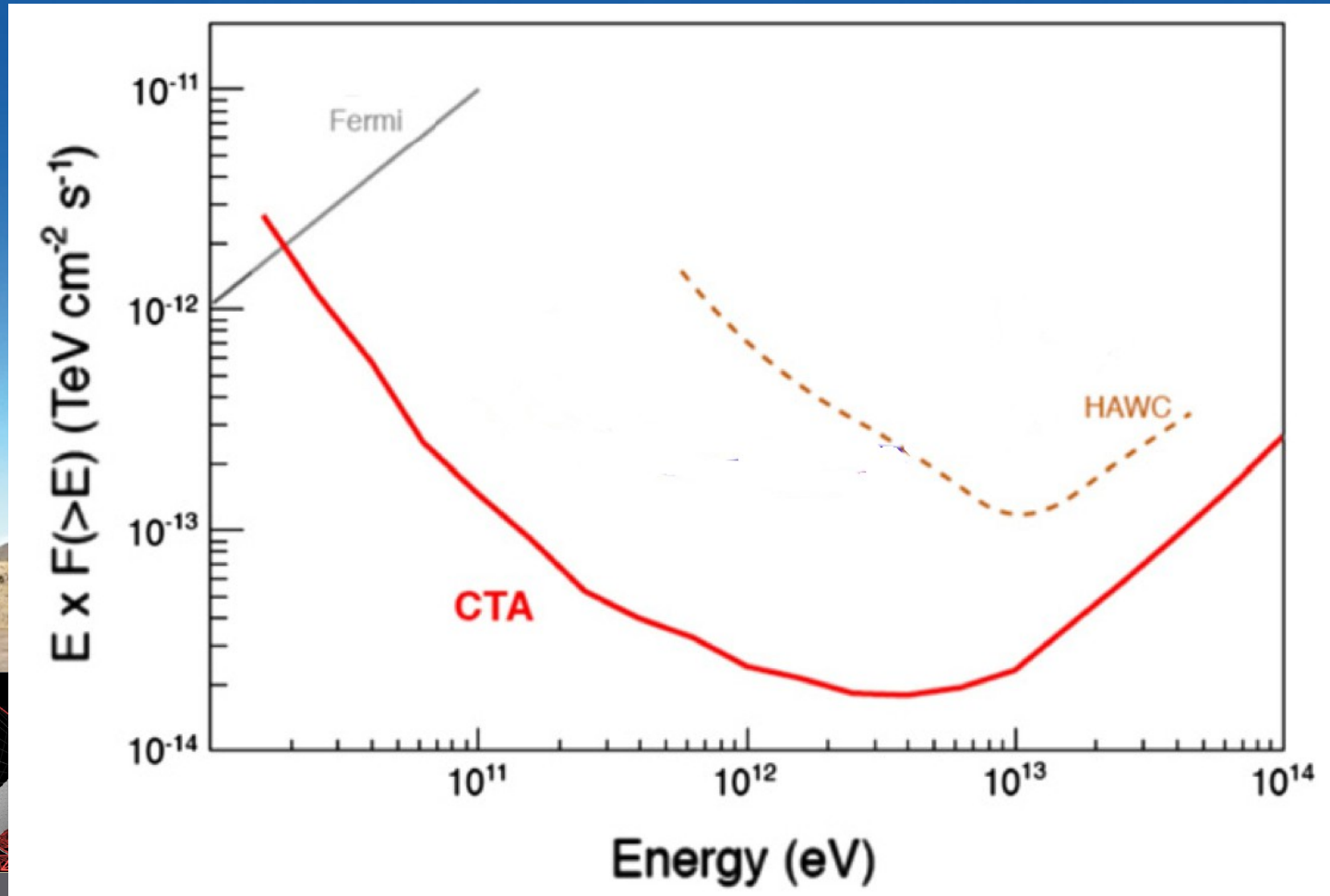
**Sky survey at the highest energies**



# The Cherenkov Telescope Array concept

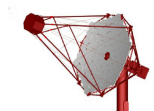
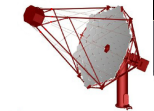
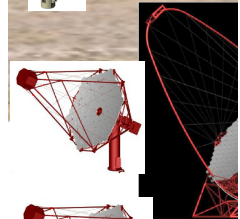
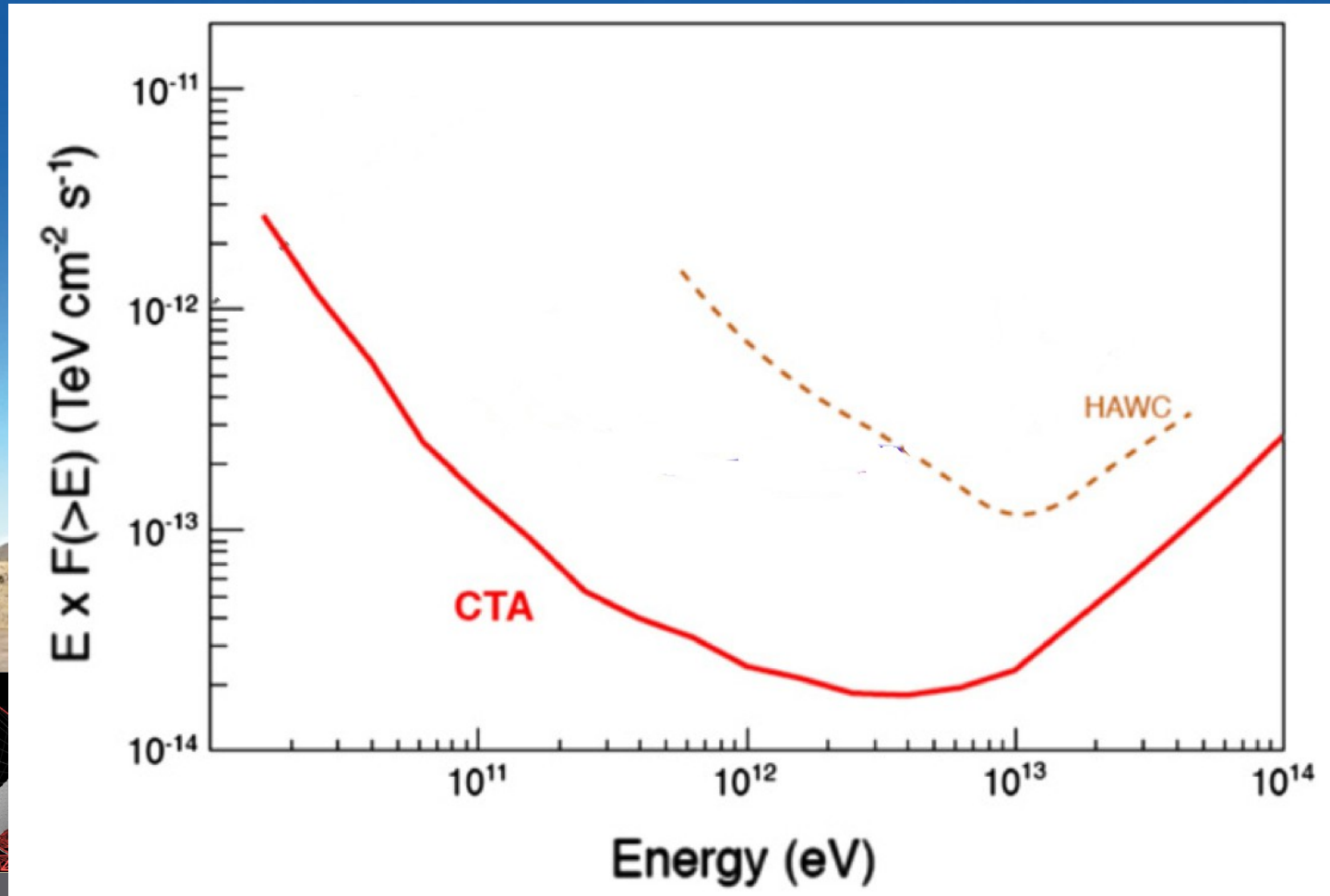


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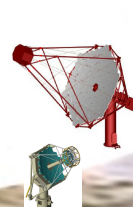
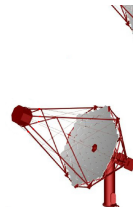
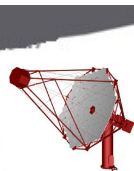
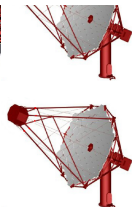
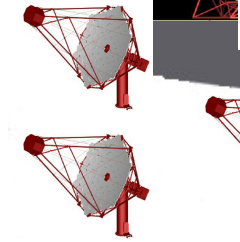
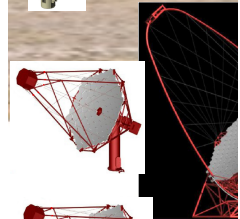
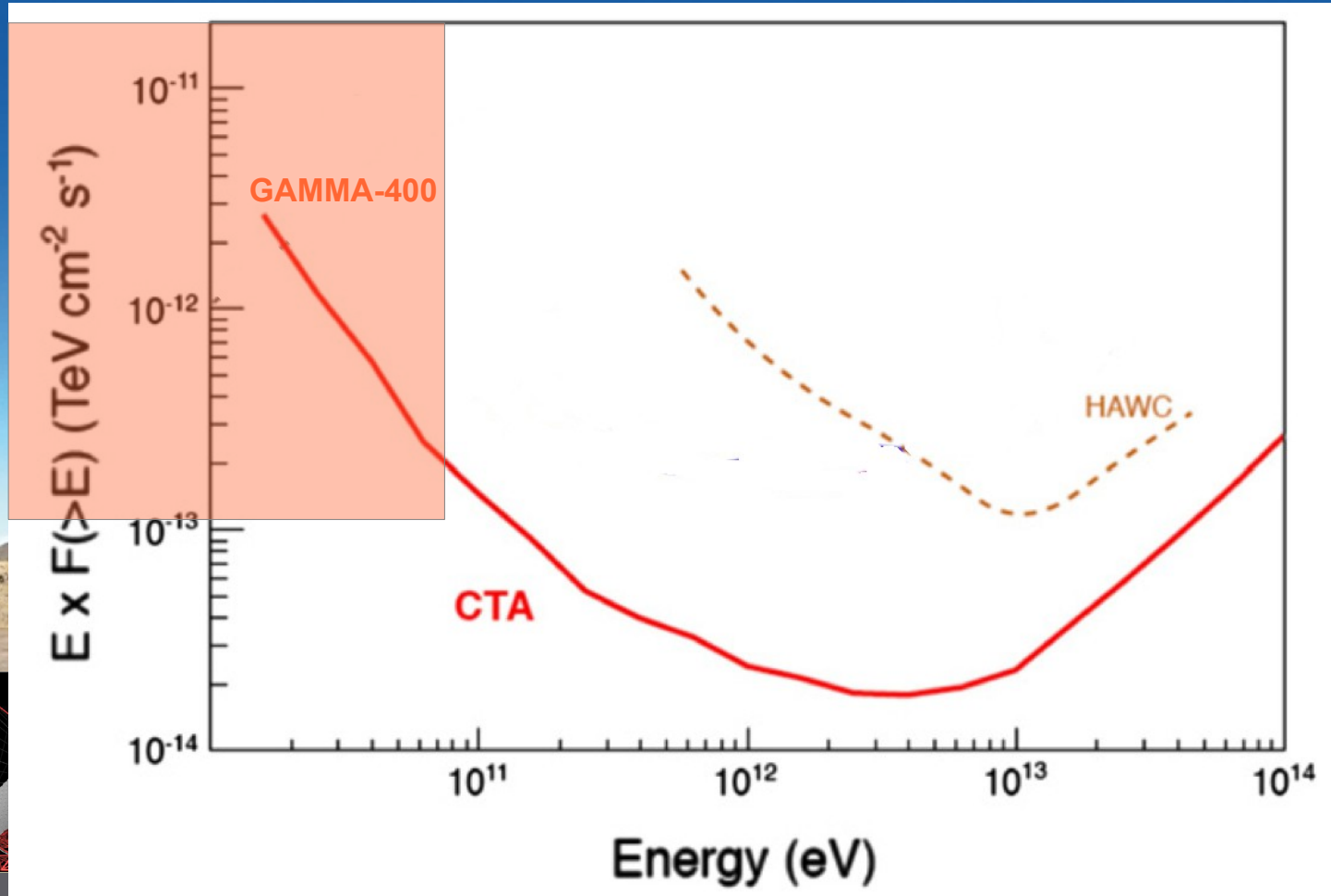




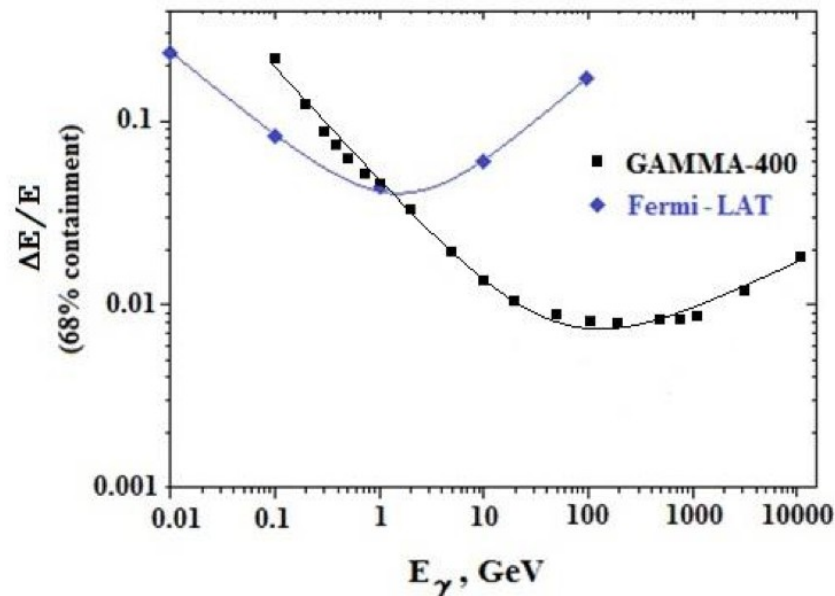
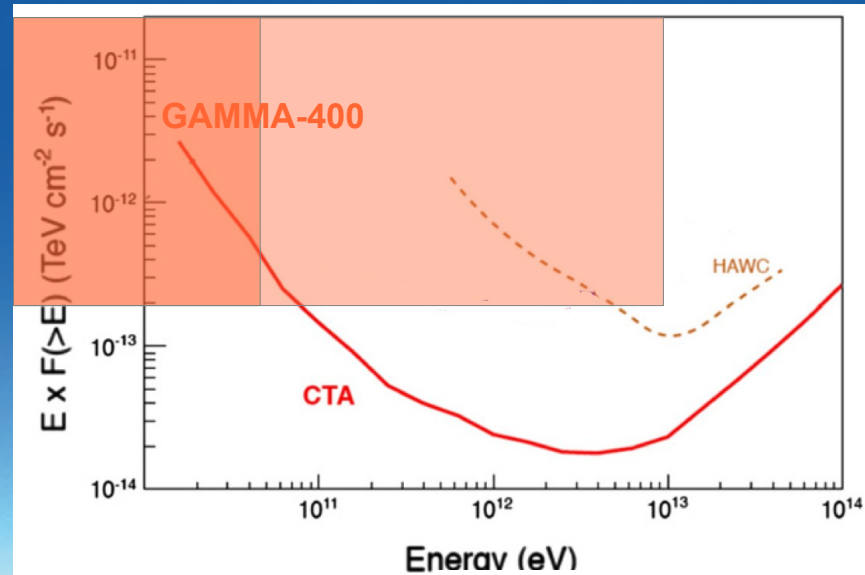
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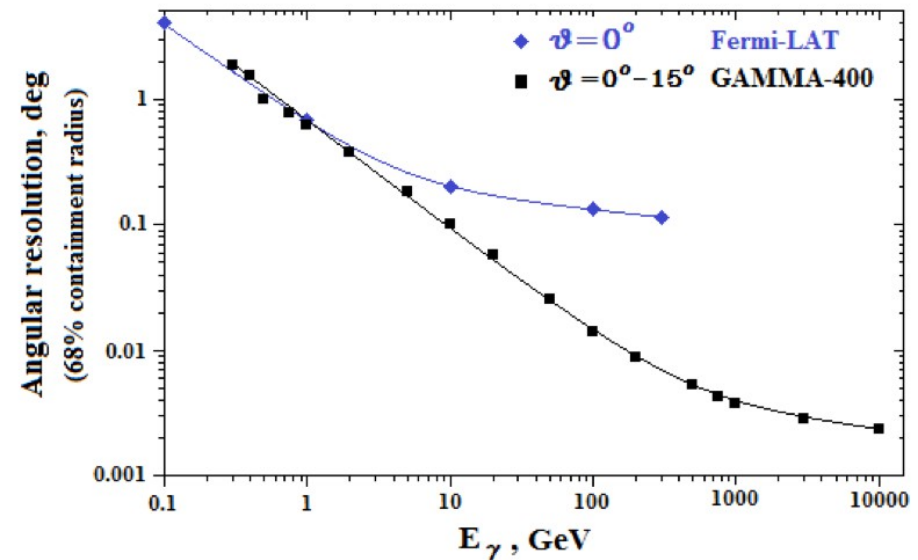
# The Cherenkov Telescope Array concept



# The Cherenkov Telescope Array concept



**Figure 2:** Energy resolution vs. energy for normal incidence for Fermi-LAT [9] and GAMMA-400.



**Figure 3:** Angular resolution vs. energy for Fermi-LAT [9] (for normal incidence) and GAMMA-400 (for  $\theta=0^\circ-15^\circ$ ).

# Conclusions

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As already said by CTA Spokesperson and CTA Observatory director

The Cherenkov Telescope Array will profit from the information provided by GAMMA-400

Similarly to the current generation of IACTs with Fermi but less as survey and more as “pointing telescope” ...

To study with high energy and angular resolution CTA sources