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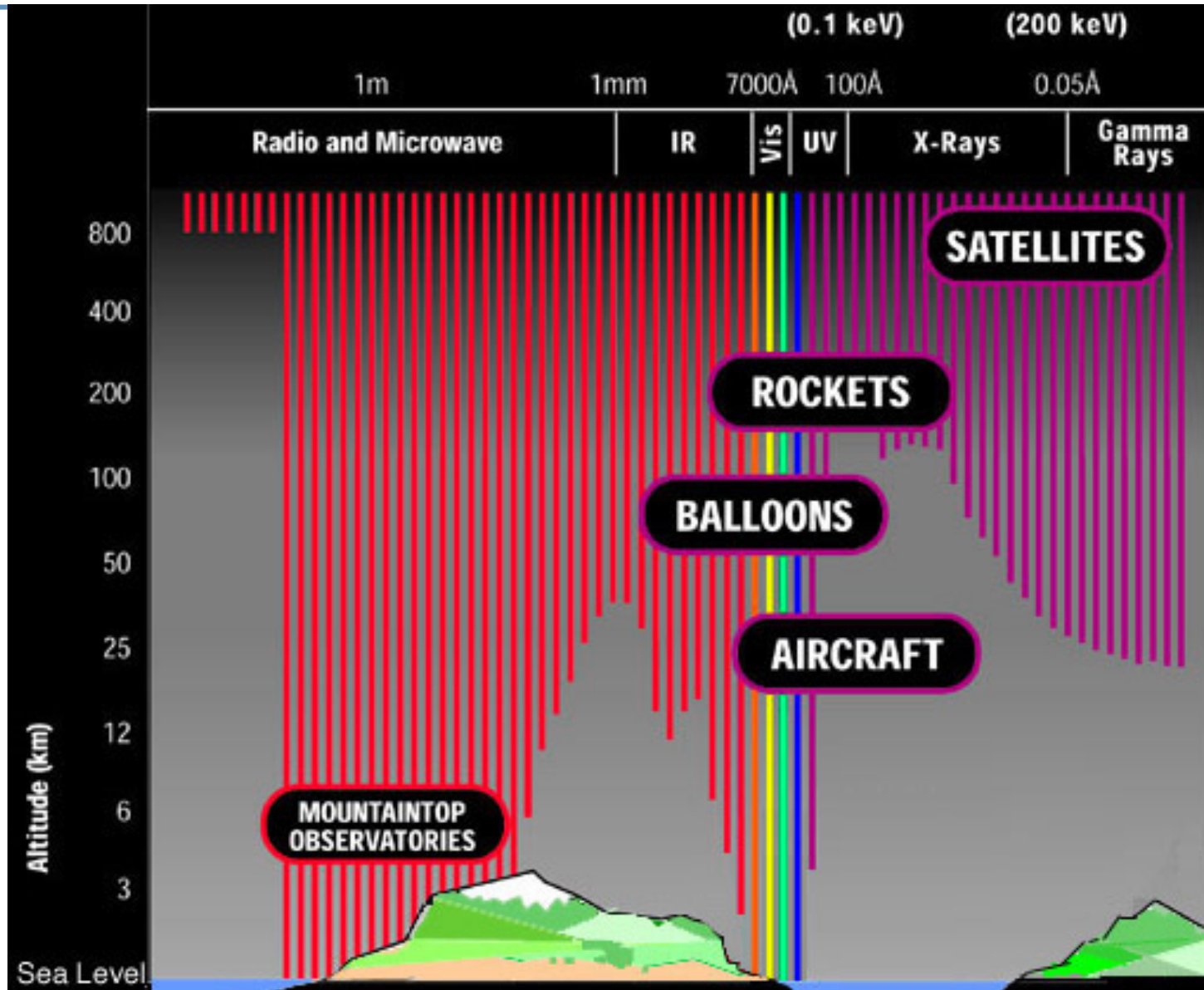
**CTA**  
**IL FUTURO**  
**DELL'ASTRONOMIA GAMMA**  
**CHERENKOV TELESCOPE ARRAY**

**Patrizia Caraveo**

**Qual è il posto migliore per studiare i raggi gamma?**



# IMPARIAMO A SFRUTTARE L'ATMOSFERA



**COSA SUCCEDE QUANDO UN FOTONE  
O UNA PARTICELLA DI ALTA ENERGIA  
COLPISCONO L'ATMOSFERA?**



*Intensità dell'immagine*

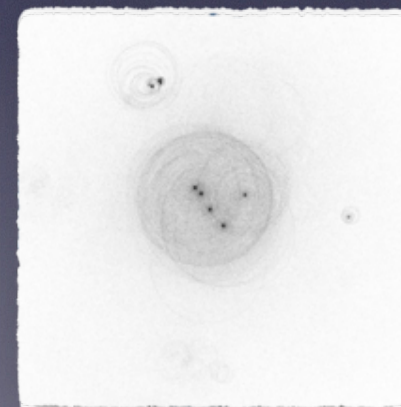
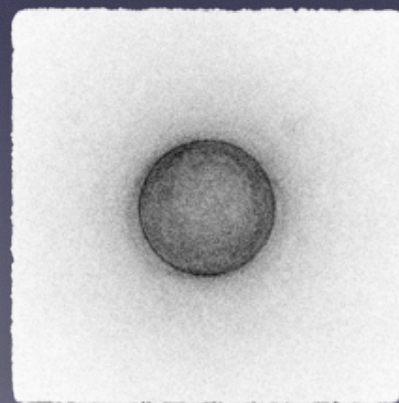
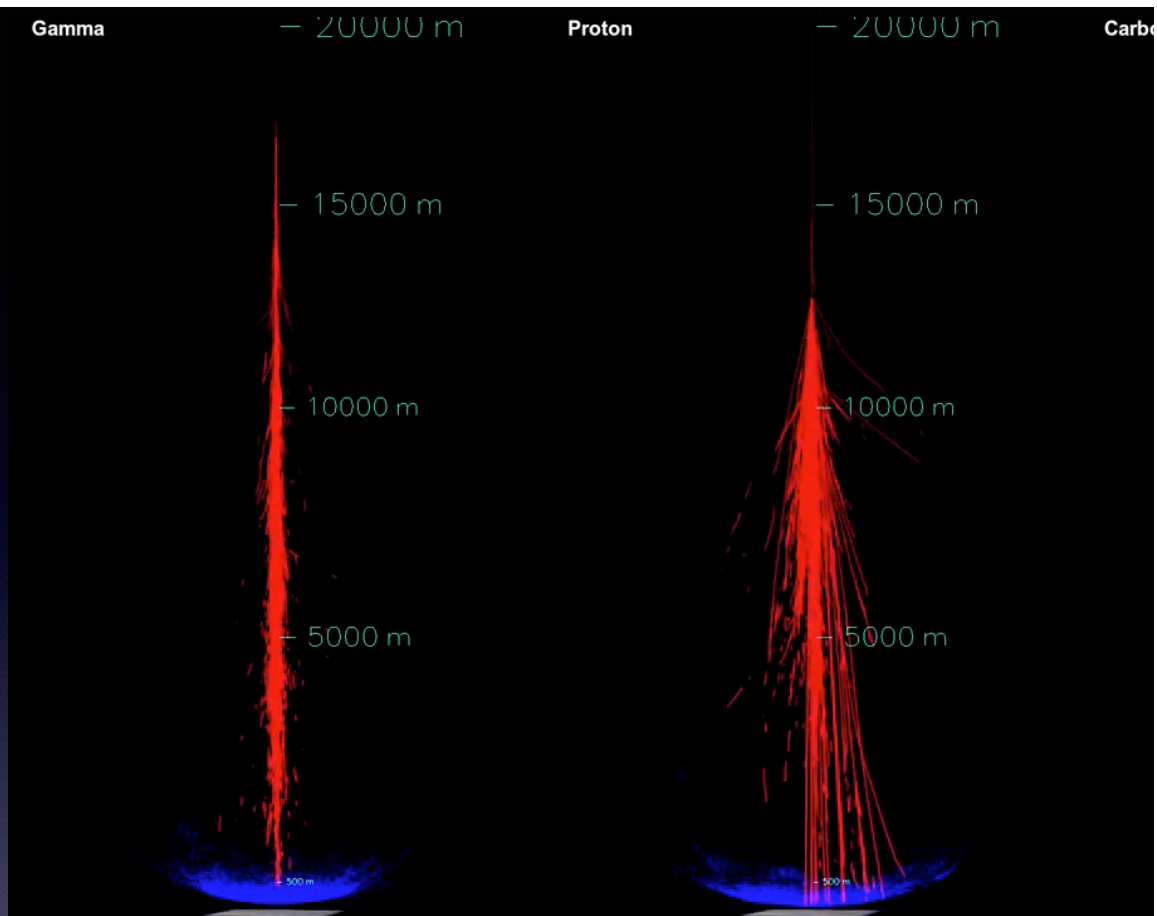
↳ *energia*

*orientamento*

↳ *direzione*

*Forma dell'immagine*

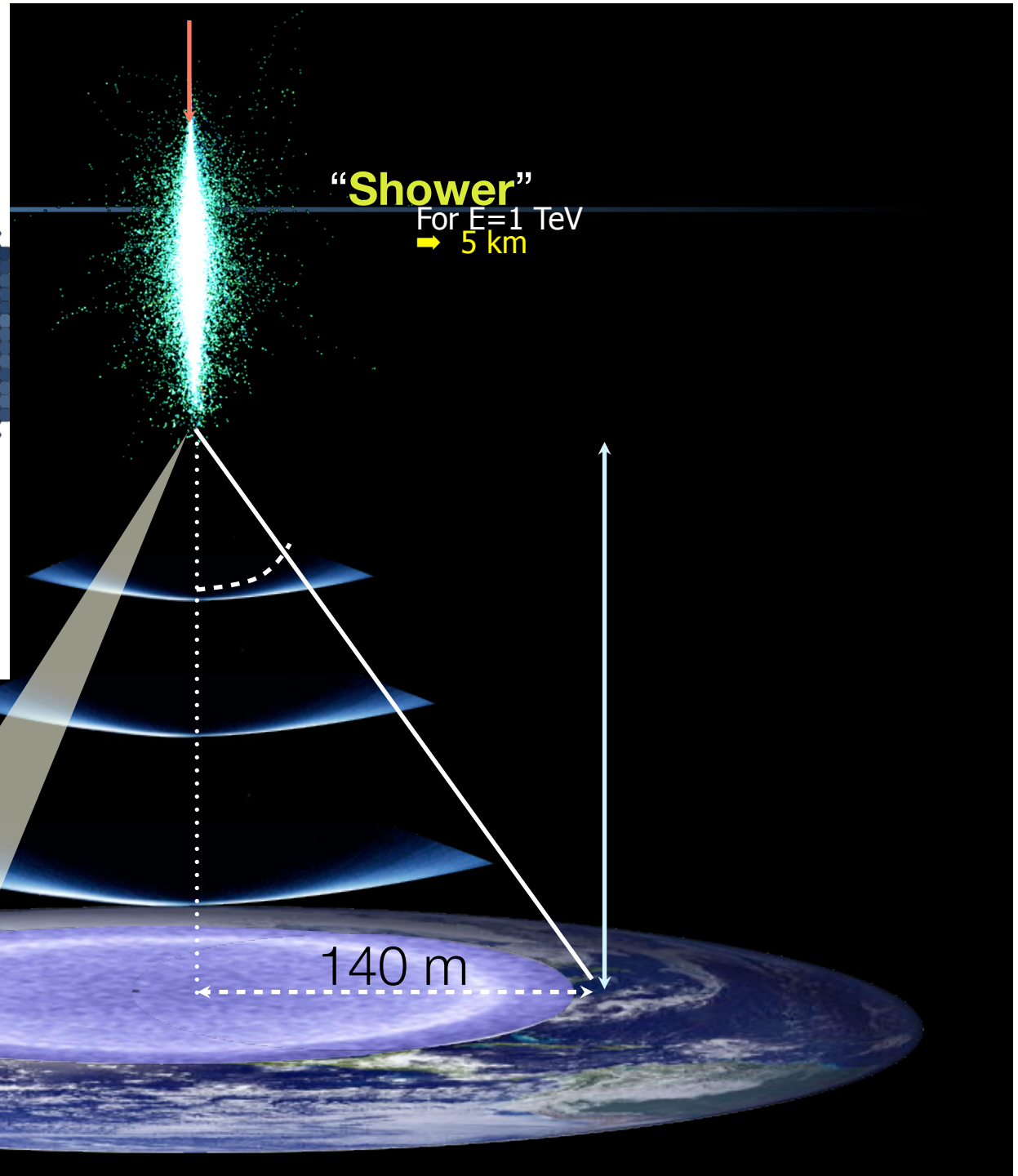
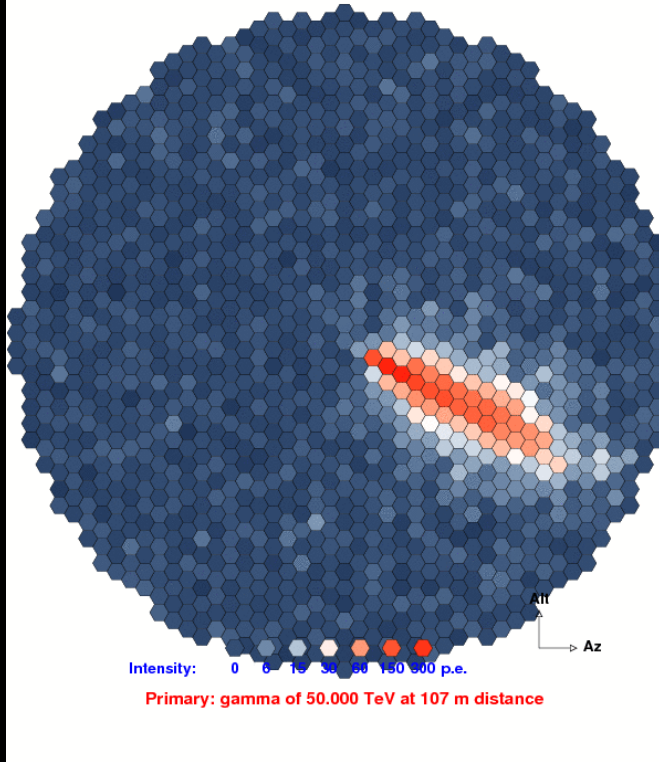
↳ *tipo di particella*



ta  
ankov telescope array

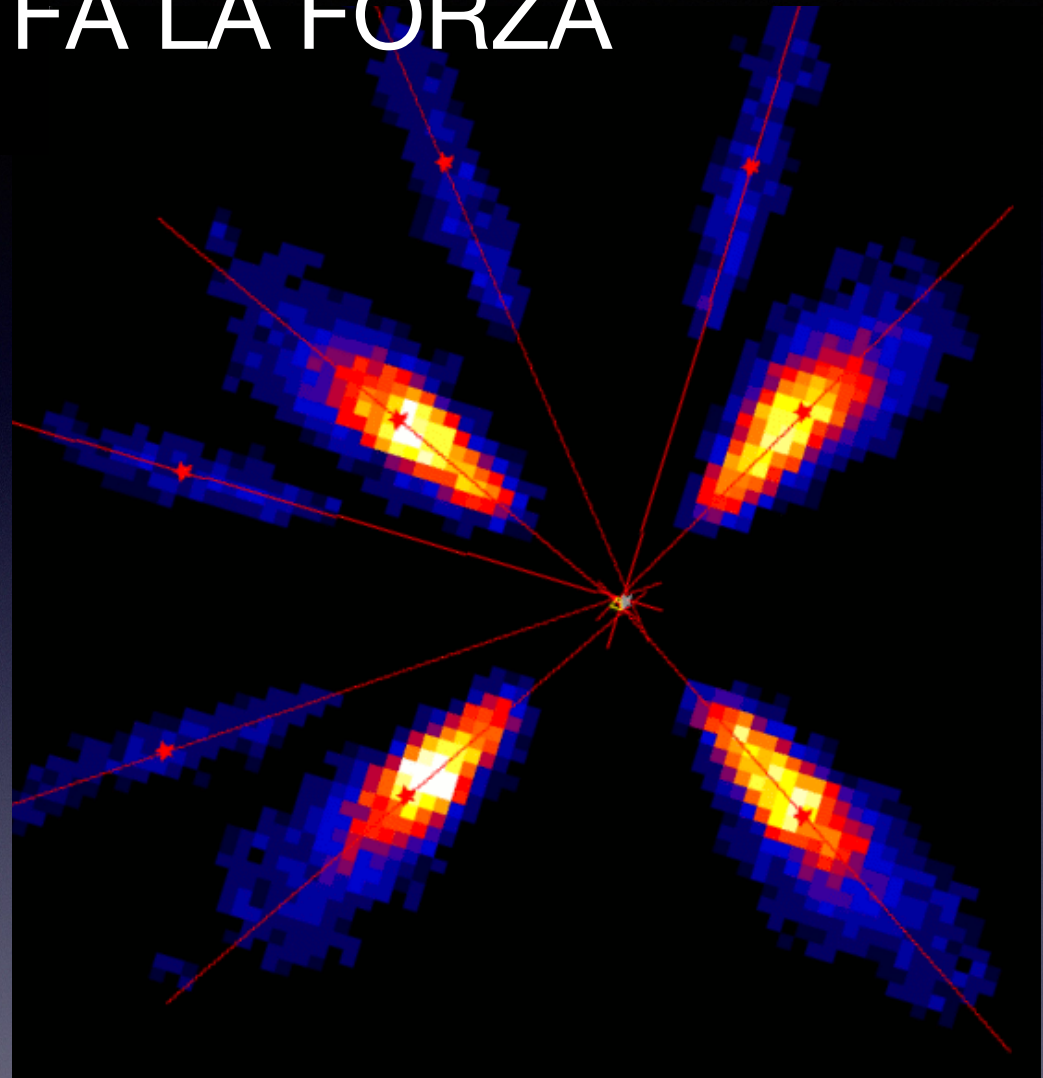
num 1, event 4, array 0, telescope 1

Time = 11.0 nanoseconds



# L'UNIONE FA LA FORZA

INCROCIANDO LE  
INFORMAZIONI  
PRODOTTE DA  
DIVERSI TELESCOPI  
SI OTTENGONO  
RISULTATI MIGLIORI



**Simulation:**

Superimposed images  
from  
8 cameras



# Osservatori gamma operativi al suolo

MAGIC Canary Islands 2200 m asl  
2 x 17m telescopes. Magic I in operation since Oct 2003, Magic II first light shown at ICRC09

VERITAS Arizona, USA 1800 m asl  
4 telescopes of 12m diameter  
fully operational from fall 2007



MAGIC

VERITAS

VERITAS

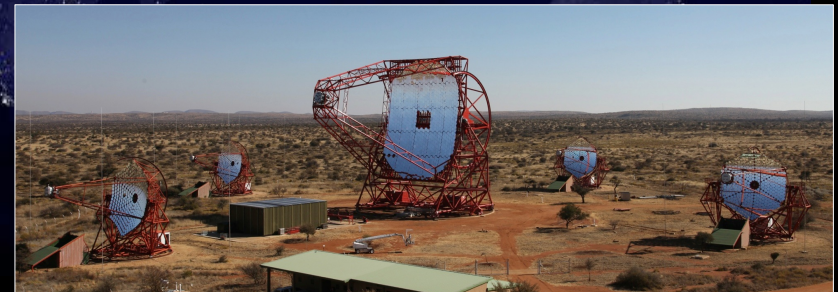


MAGIC

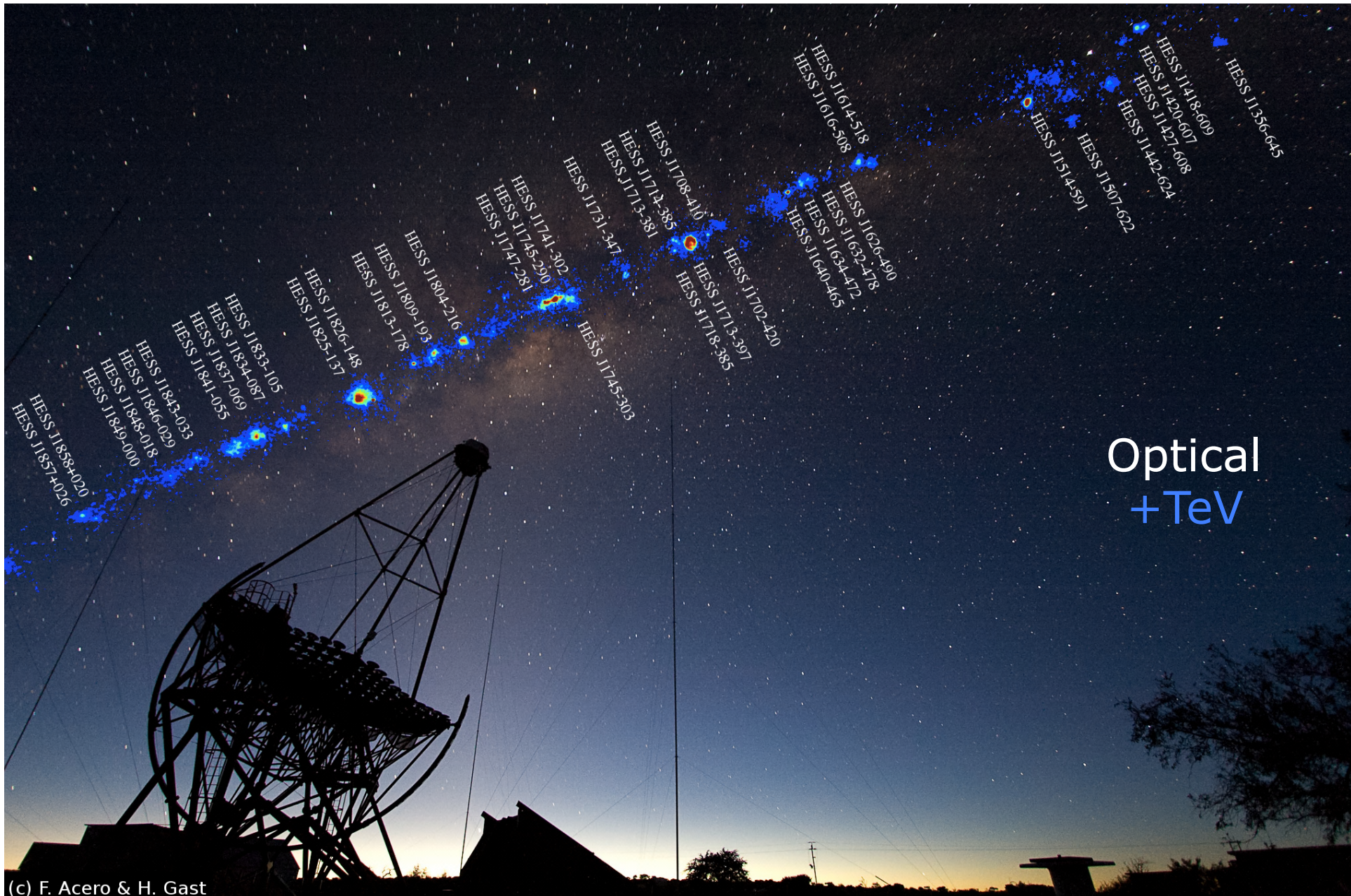
HESS

HESS Namibia 1800 m asl  
HESS I: 4 telescopes of 12m diameter  
HESS II: 28 m diameter

HESS

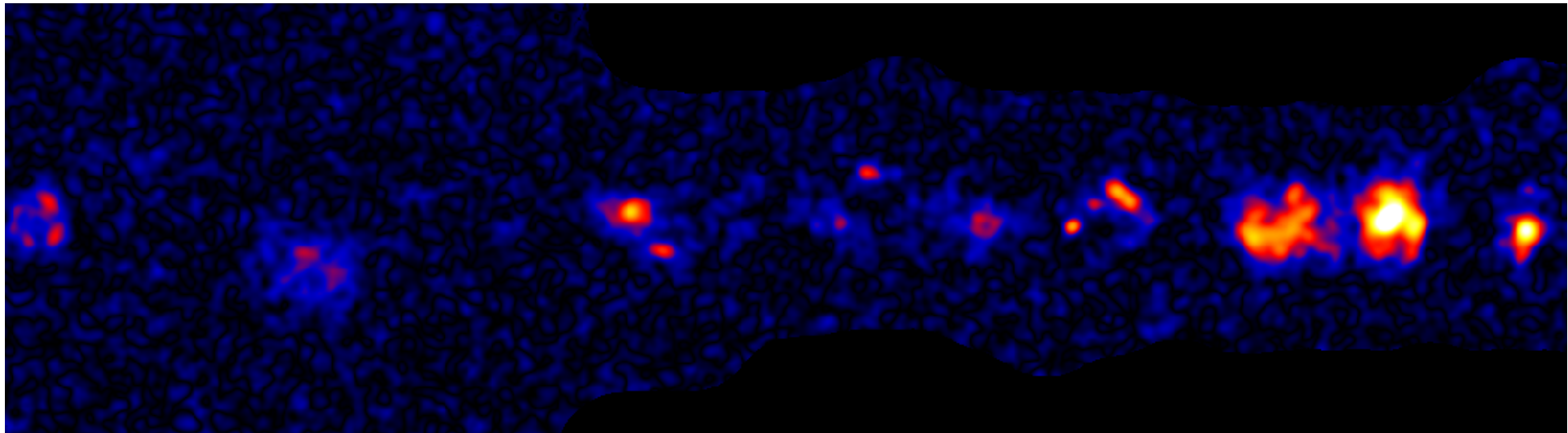
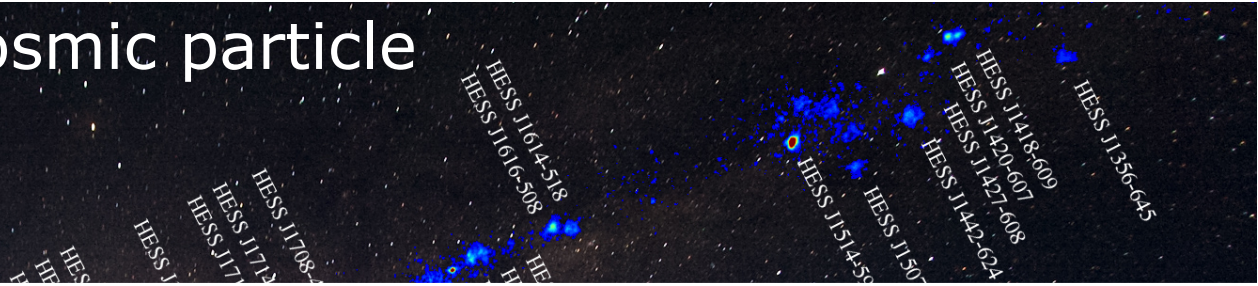






(c) F. Acero & H. Gast

Each object is a cosmic particle accelerator...



# Una schiera di telescopi Cherenkov

## COME ?

- $\gamma$  di bassa energia sono tanti ma producono segnale debole  
→ ci vogliono telescopi molto grandi
- $\gamma$  di alta energia sono pochi ma producono segnale forte  
→ specchi piccoli sparsi su grande area

Pochi telescopi grandi per le basse energie

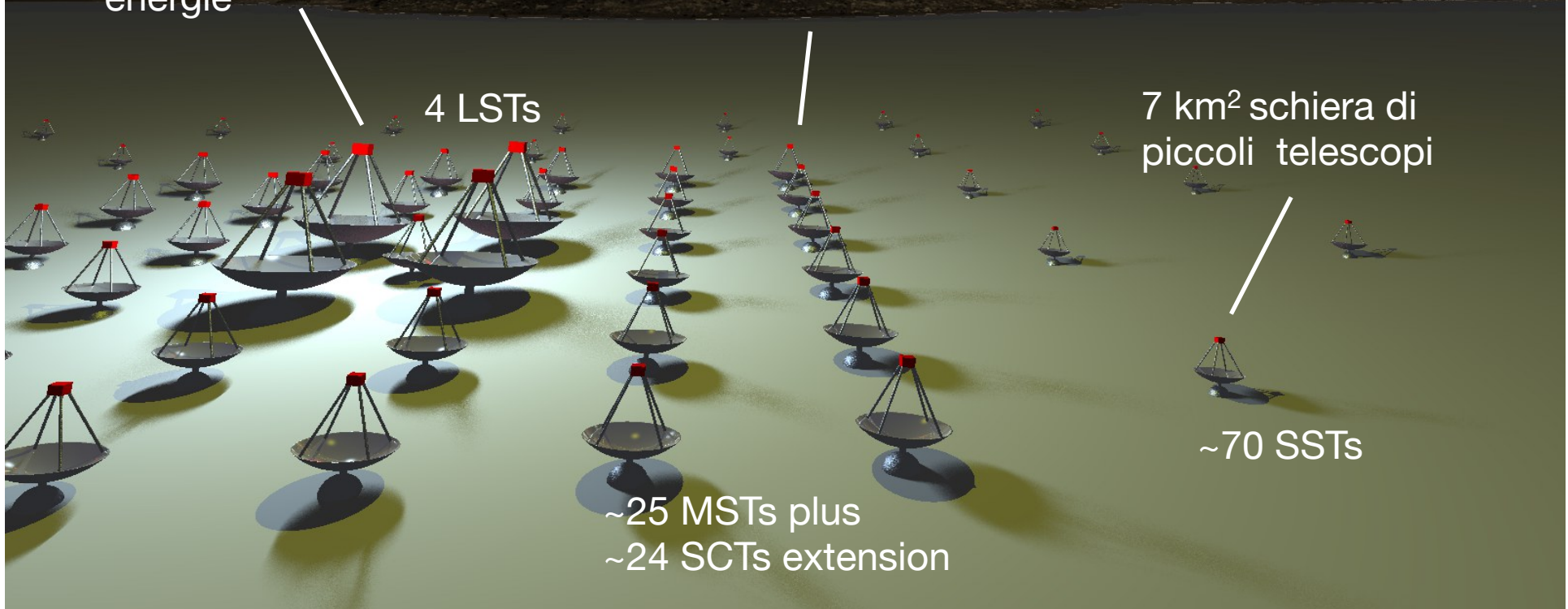
~km<sup>2</sup> schiera di telescopi medi

4 LSTs

7 km<sup>2</sup> schiera di piccoli telescopi

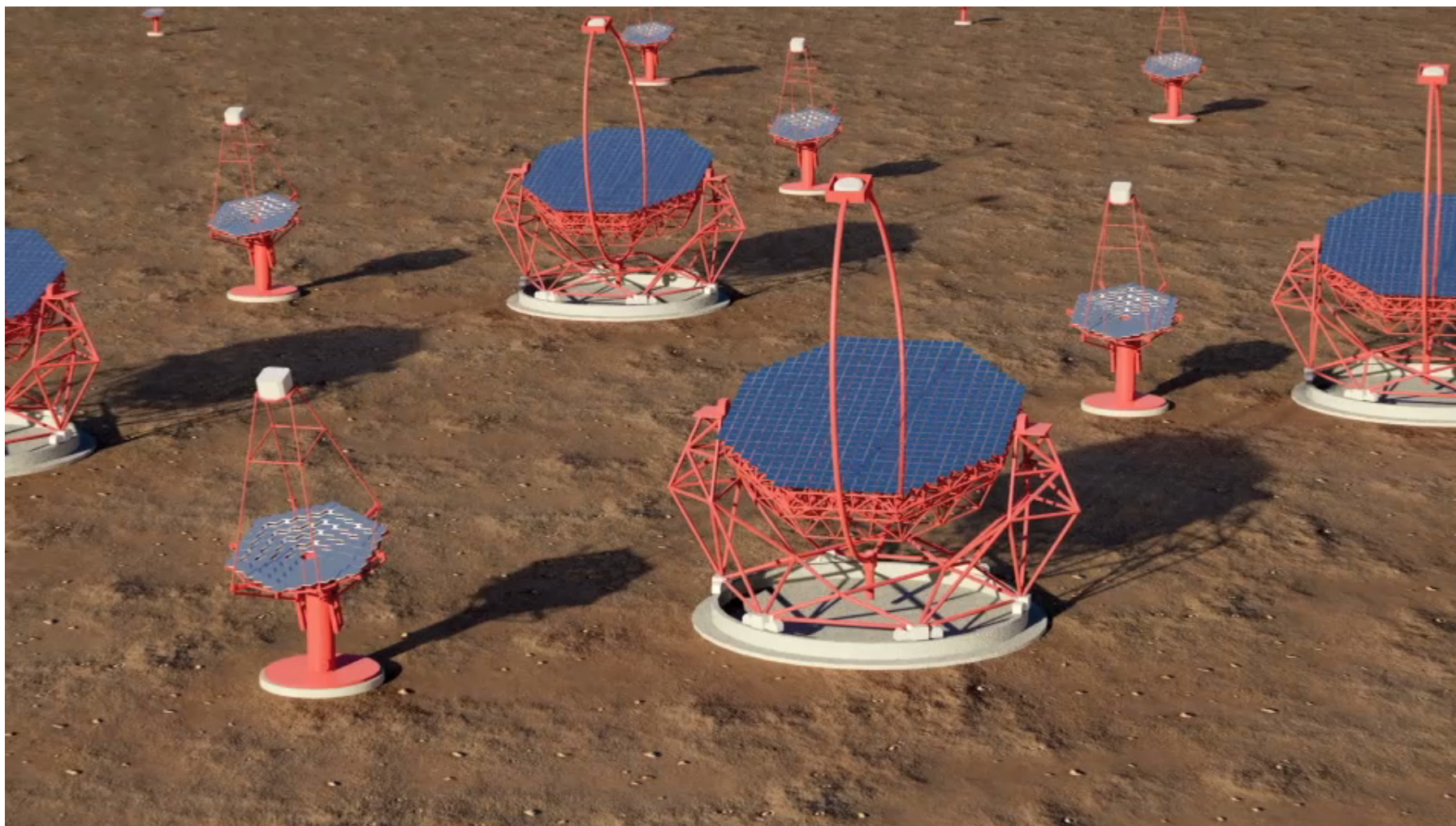
~70 SSTs

~25 MSTs plus  
~24 SCTs extension



# Rendering della schiera di telescopi nel sito sud

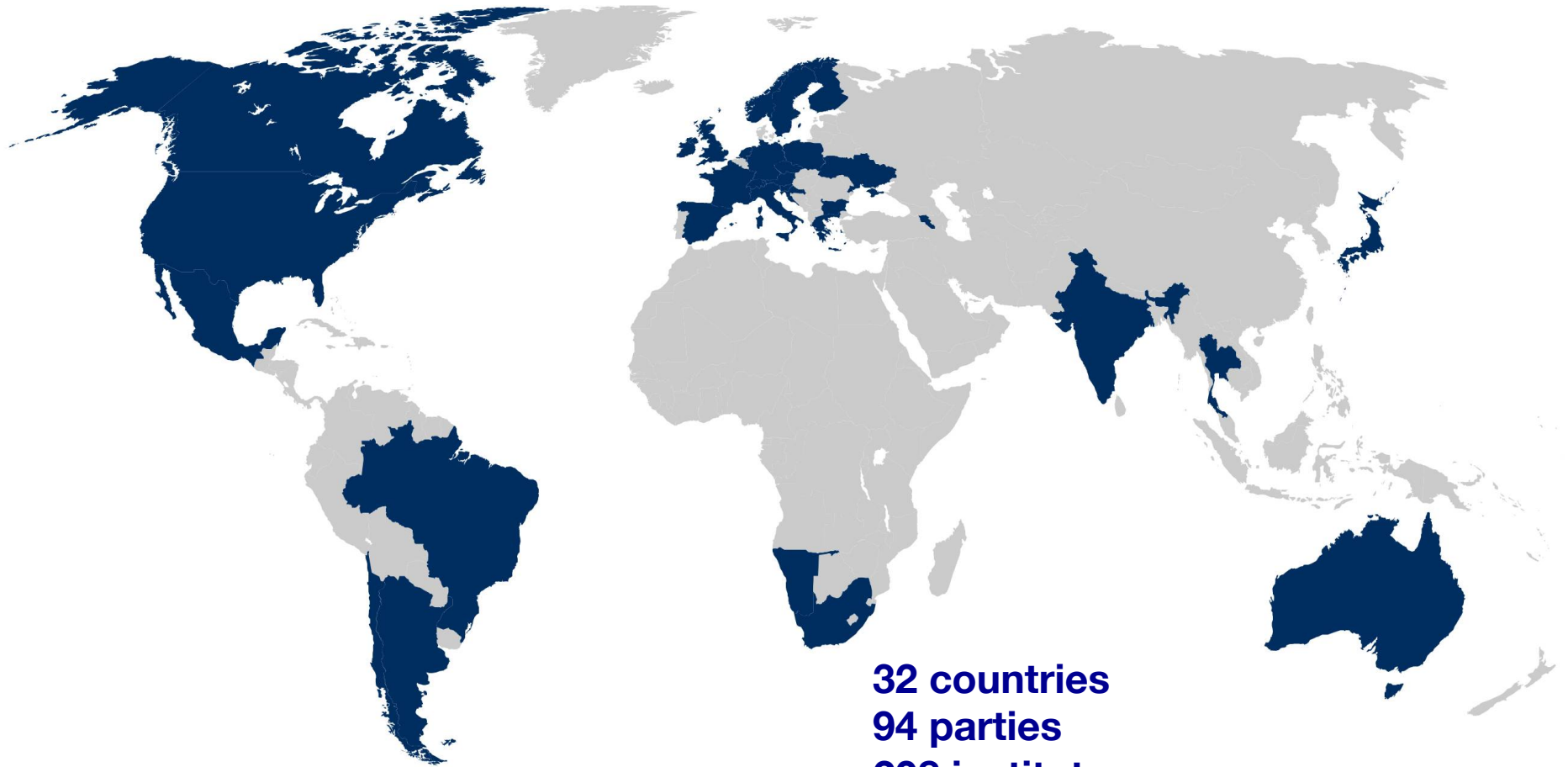
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# CHI LO COSTRUISCE?

## CTA CONSORTIUM

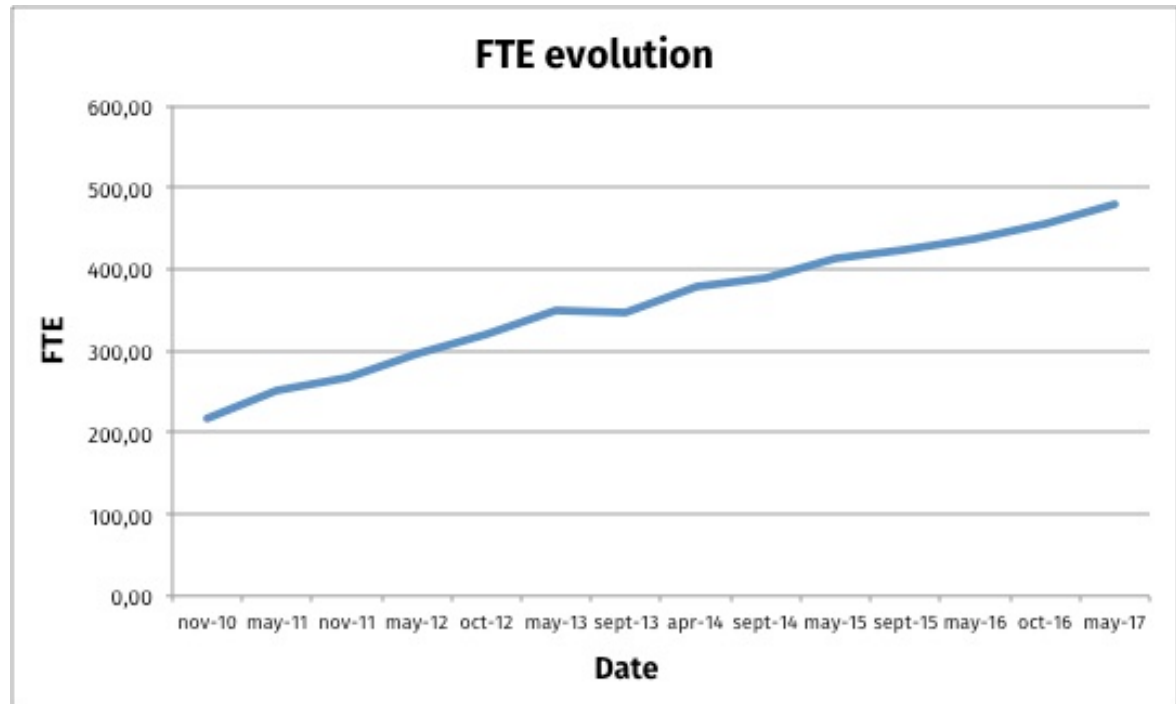
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**32 countries**  
**94 parties**  
**208 institutes**  
**1402 members (480 FTE)**

# CONSORTIUM STATUS

Country	Members	FTE	FTE (%)
Italy	243	94,4	19,6%
France	213	84,0	17,5%
Germany	187	81,0	16,8%
Spain	107	44,3	9,2%
Japan	118	34,9	7,3%
USA	88	25,8	5,4%
Poland	56	17,3	3,6%
Switzerland	29	14,3	3,0%
Brazil	41	11,9	2,5%
United Kingdom	47	11,8	2,4%
Netherlands	23	10,6	2,2%
South Africa	24	6,3	1,3%
Chile	36	6,2	1,3%
Czech Republic	26	5,7	1,2%
Sweden	11	3,0	0,6%
Argentina	11	2,7	0,6%
Croatia	11	2,6	0,5%
Norway	7	2,5	0,5%
Greece	24	2,4	0,5%
Slovenia	9	2,4	0,5%
India	10	2,2	0,4%
Austria	10	2,1	0,4%
Australia	20	2,0	0,4%
Thailand	5	1,9	0,4%
Mexico	9	1,8	0,4%
Ukraine	10	1,7	0,3%
Canada	4	1,5	0,3%
Armenia	5	1,2	0,2%
Finland	6	1,2	0,2%
Ireland	7	0,8	0,2%
Bulgaria	6	0,5	0,1%
Namibia	2	0,3	0,1%



Consortium keeps growing with stable pace

431 members with >50% FTE

Breakdown:

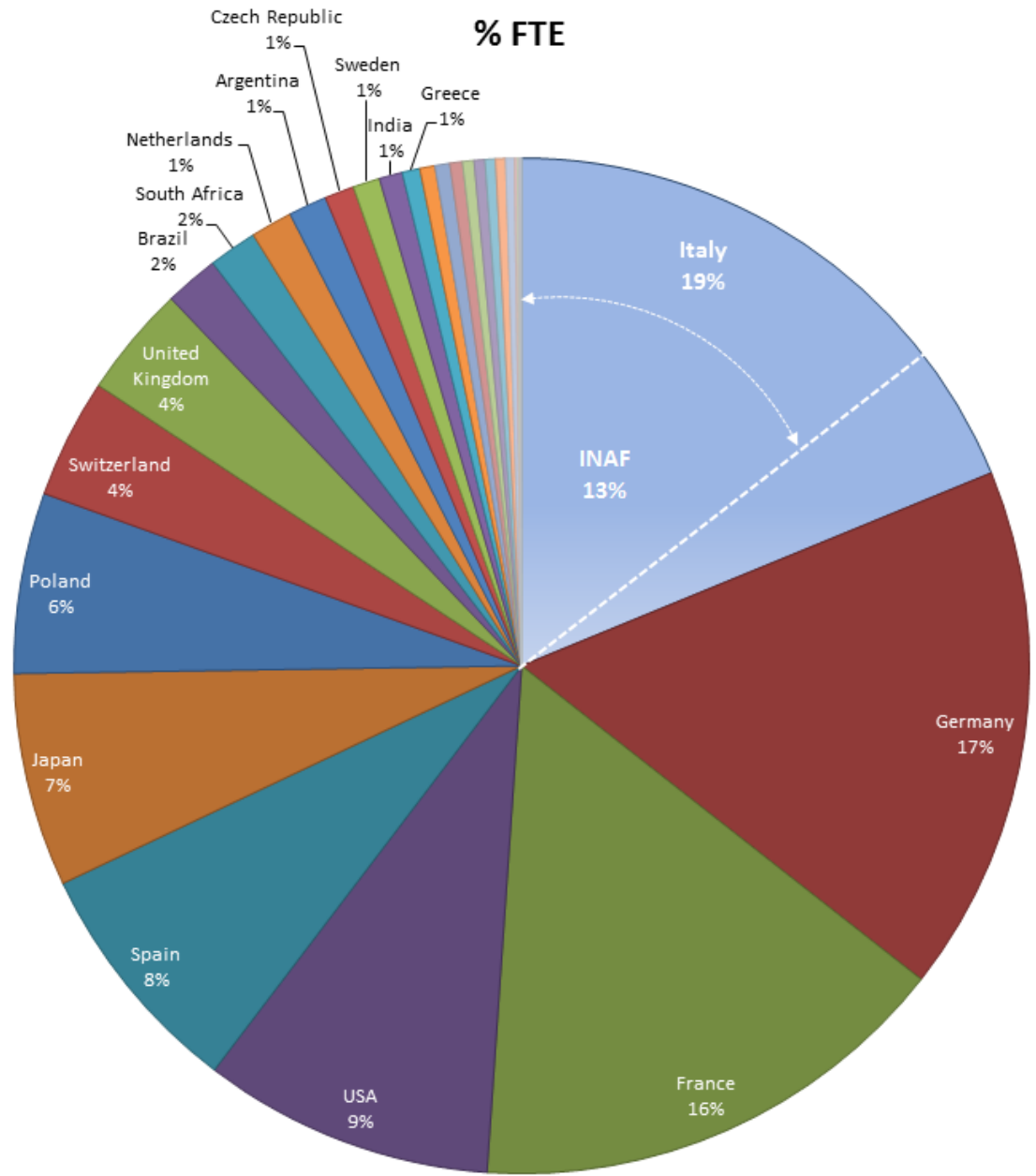
Scientists: 879 (63%)

Engineers: 316 (22%)

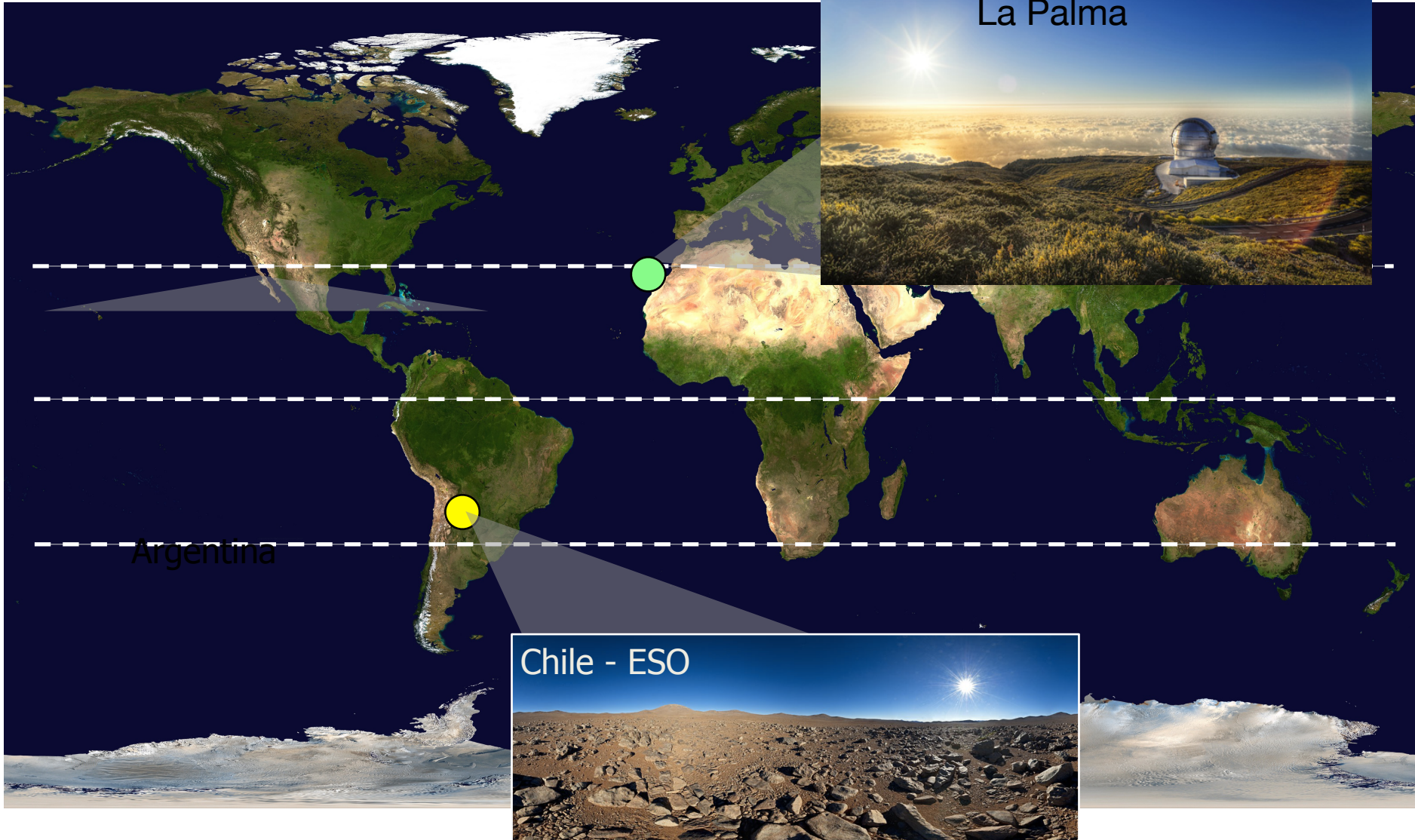
Students: 190 (14%)

Administration: 20 (1%)

14



# DOVE?



La Palma

Argentina

Chile - ESO



- **QUALE è IL CONTRIBUTO ITALIANO ?**

**INAF ha sviluppato il telescopio ASTRI**

# ASTRI

end-to-end prototype



# Prossimo compito: costruire una mini-schiera

