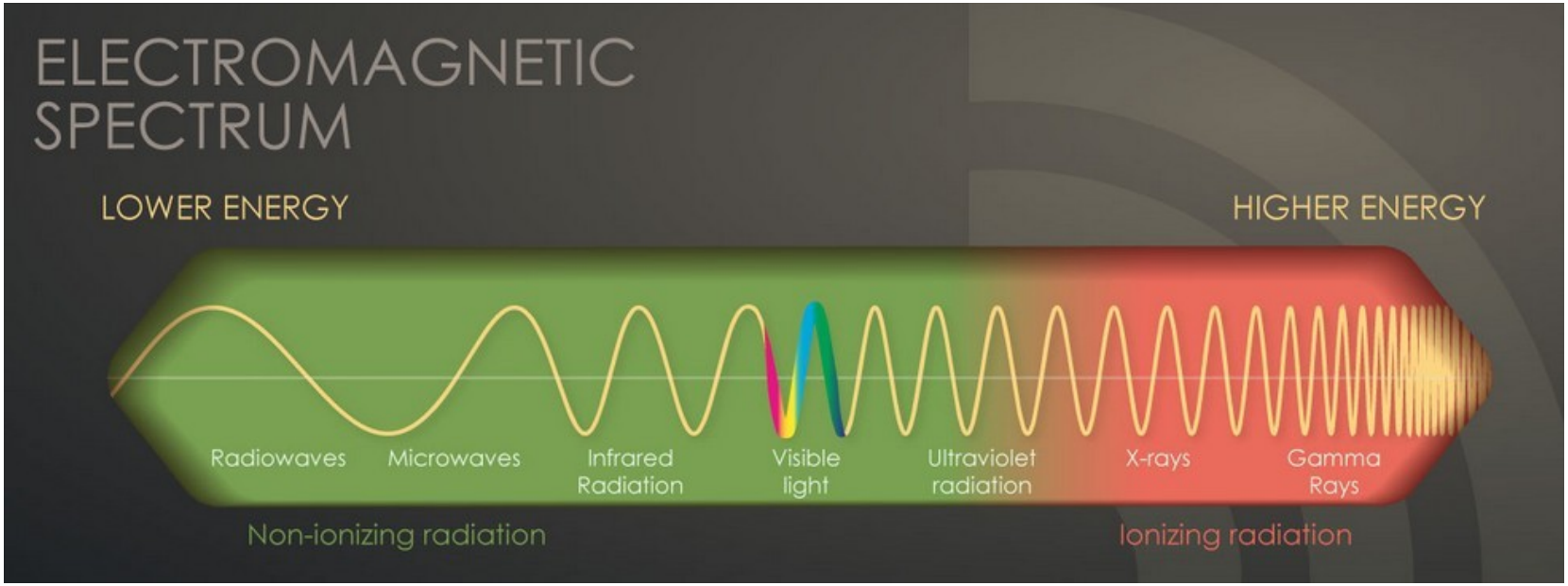
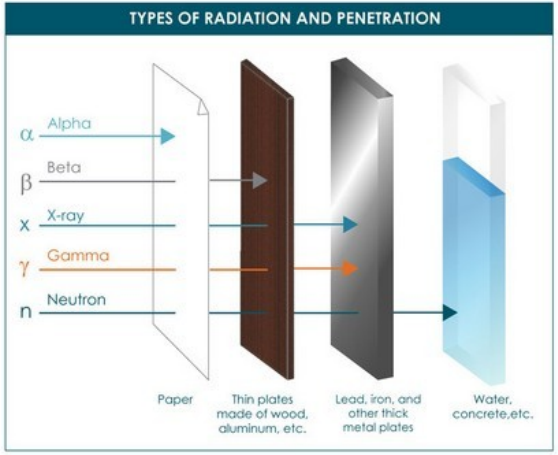
# CTA ed i Raggi Gamma dal Cielo




Cosa sono i  raggi gamma?
...luce, ma con tanta energia



250000 giri/s onde radio

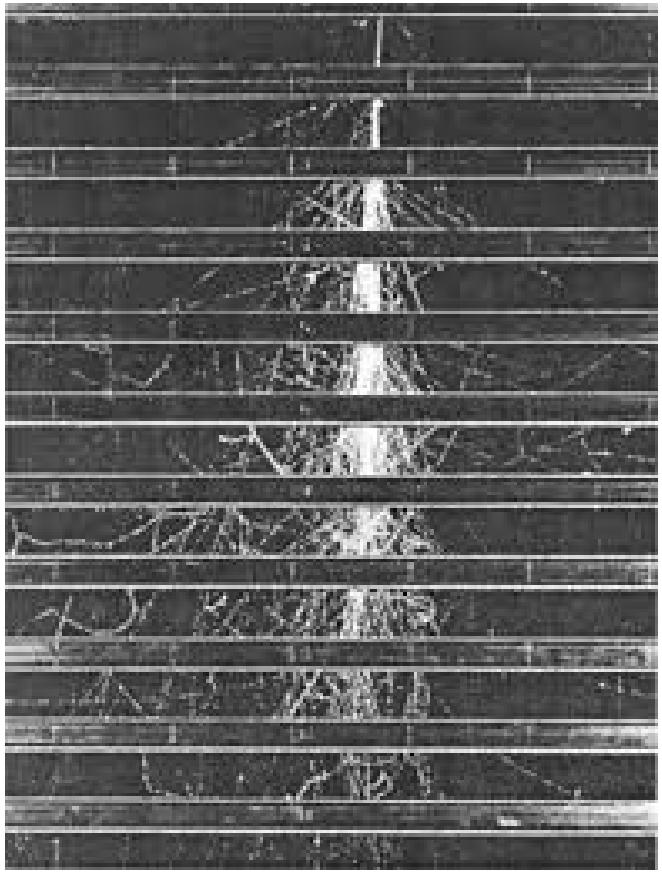
$30*10^{18}$ giri/s raggi X

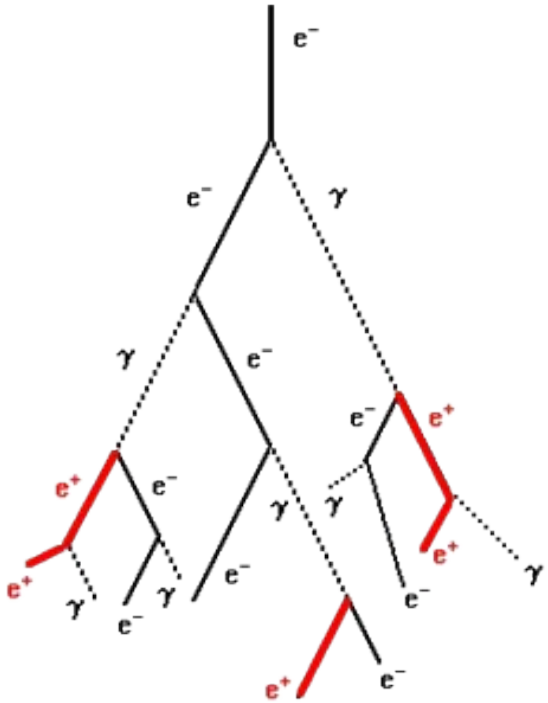
$500*10^{12}$ giri/s luce visibile

$>10^{20}$ giri/s raggi gamma

ogni giro -> la stessa energia

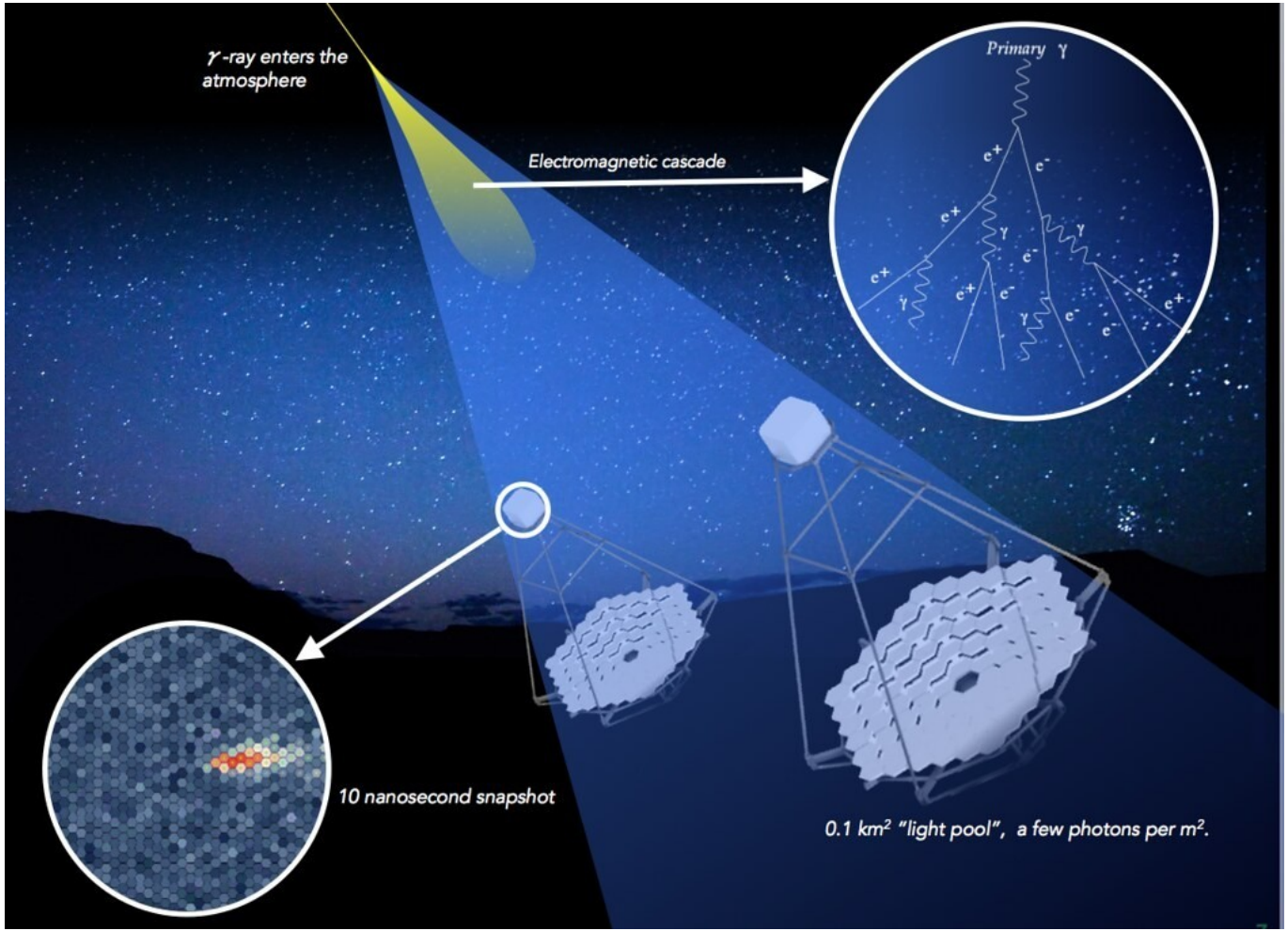
# Come osservare un raggio gamma



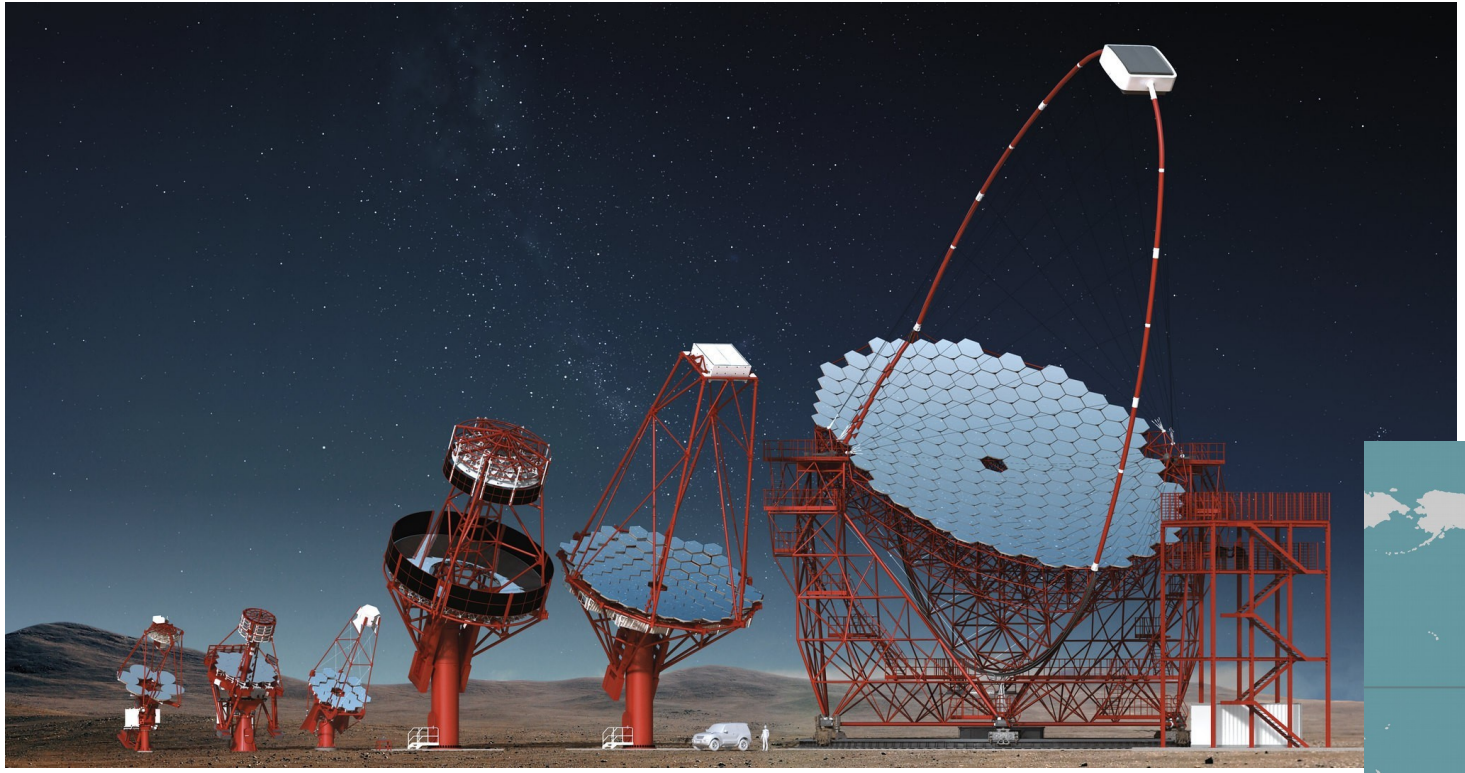



Particelle con molta energia possono produrre
un grande numero di particelle con minore energia

# Osservare raggi gamma da terra



# Il Cherenkov Telescpes Array



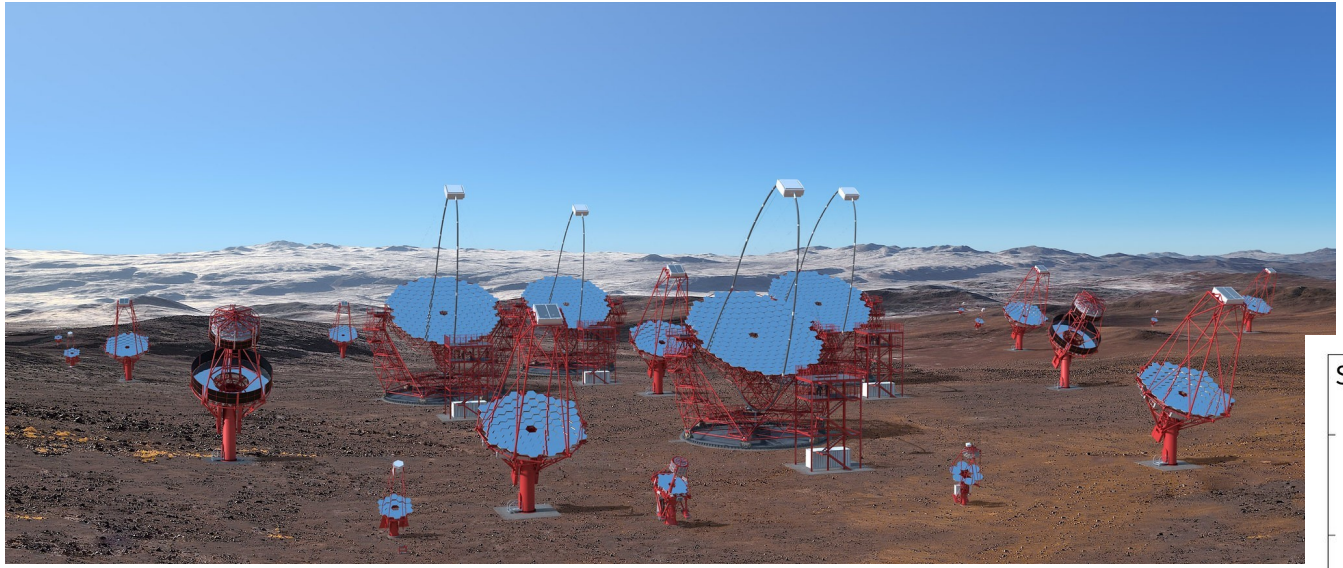
Due siti per osservare tutto il cielo

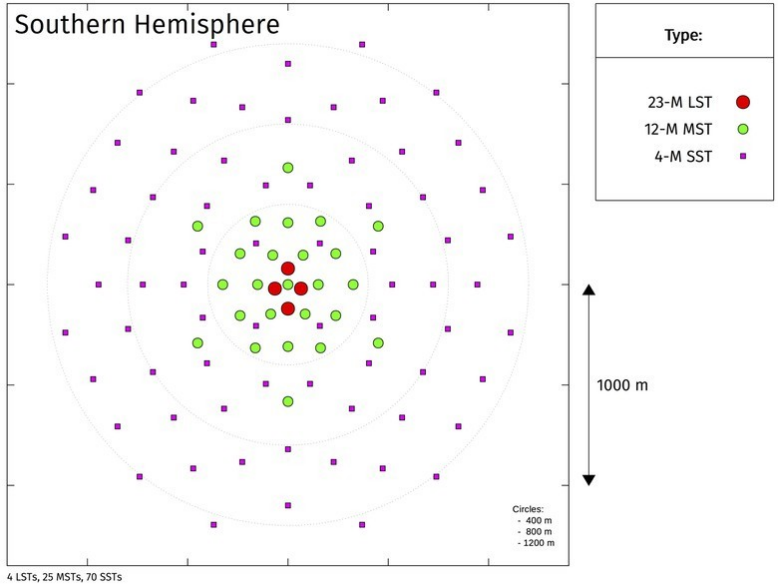

Telescopi di tre grandezze, osservano energie basse, medie ed alte

# Il sito Sud : Atacama

European Southern Observatory (ESO) Paranal site in Chile
Clima secco (deserto) e notevole altezza (da 2000 fino a 5000m)
sono ideali per osservazioni astronomiche

# Il sito Sud : Atacama



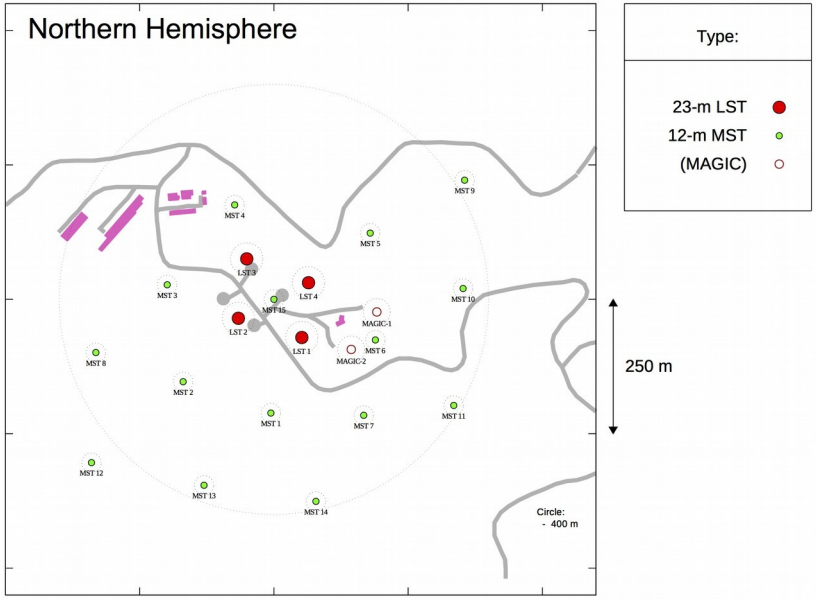



Ottimo per osservare la Via Lattea

# Il Sito Nord: La Palma

Osservatorio del Roque de los Muchachos, il principale osservatorio europeo nell’emisfero settentrionale

# Il Sito Nord: La Palma

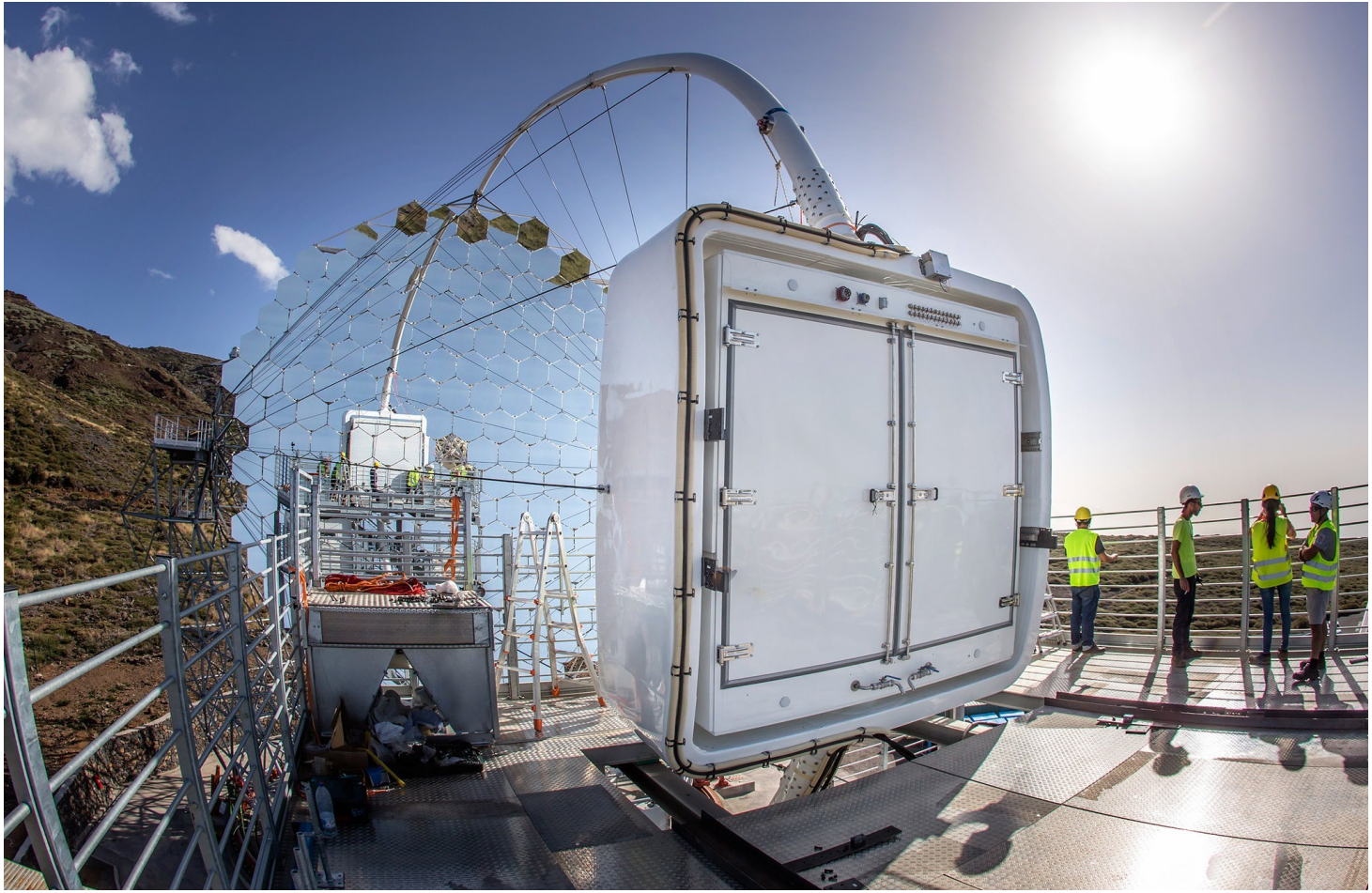



Ottimo per osservazione extra-galattiche

# LST 1


23m di diametro, 100ton, rivela raggi gamma da 20GeV e può ruotare in 30sec

# LST 1



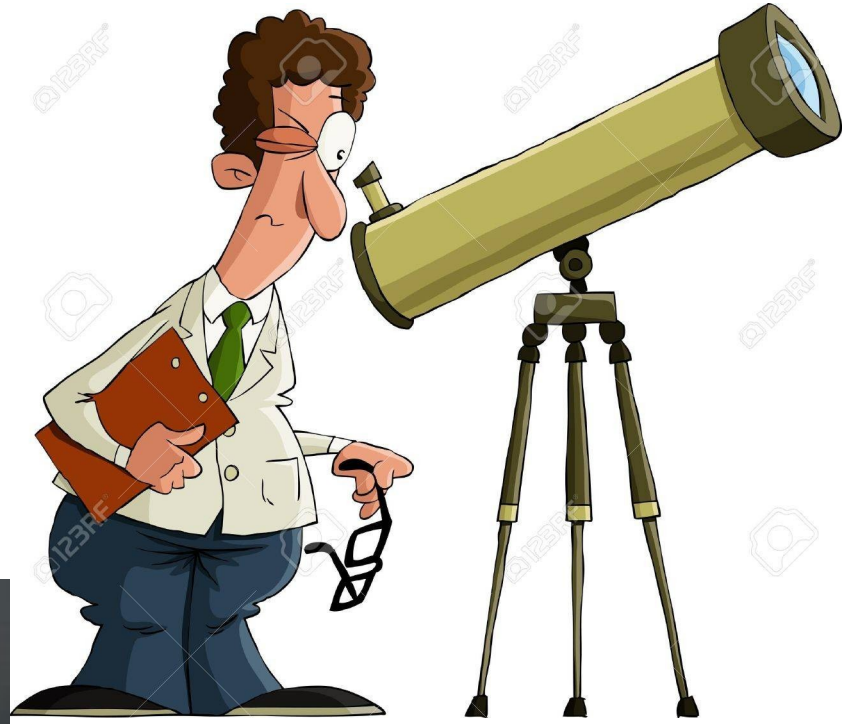
Grande e complesso. A breve altri tre a La Palma e 4 al sito sud

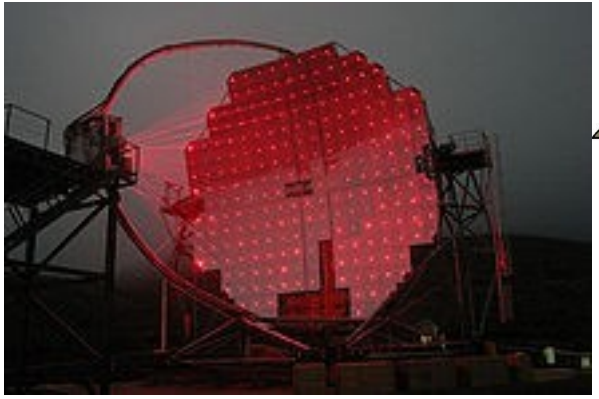
# Un turno di Osservazione

I telescopi Cherenkov sono  strumenti complessi ed adoperarli e molto impegnativo  (piena oscurità, condizioni ambientali perfette, risposta immediata a Transienti, etc..)

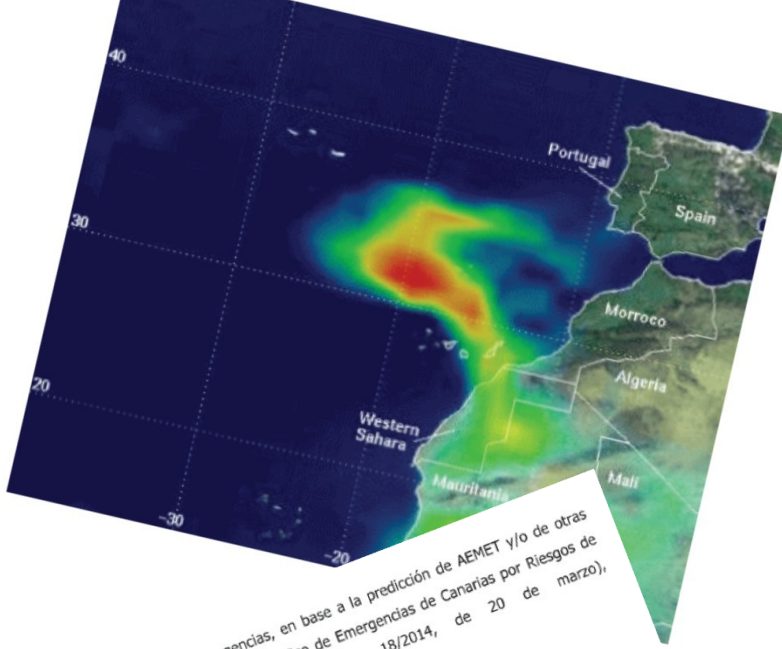
Gli astrofisici effettuato turni di osservazione di alcune settimane, recandosi presso il sito, lavorando di notte

Altri di giorno, controllano lo stato del rivelatore,
 la qualità dei dati  ottengono i primi risultati,  per fornire indicazioni per le osservazioni successive





# Che tempo fa ?




La Dirección General de Seguridad y Emergencias, en base a la predicción de AEMET y/o de otras fuentes disponibles, y en aplicación del Plan Específico de Emergencias de Canarias por Riesgos de Fenómenos Meteorológicos Adversos PEFMA (Decreto 18/2014, de 20 de marzo),

**DECLARA la situación de PREALERTA** por:

## VIENTOS

**Ámbito territorial: El Hierro, La Palma, La Gomera, Tenerife y Gran Canaria**

**Observaciones: Viento alisio fuerte y racheado. Viento del nordeste, velocidad media 40 - 60 km/h y rachas máximas en predicción de 70 - 90 km/h. El viento más intenso afectará a los municipios del sureste y noroeste de las islas, y de forma general a las medianías, a las zonas altas, y a las cumbres. No son descartables algunas rachas puntuales superiores a las indicadas en la predicción.**

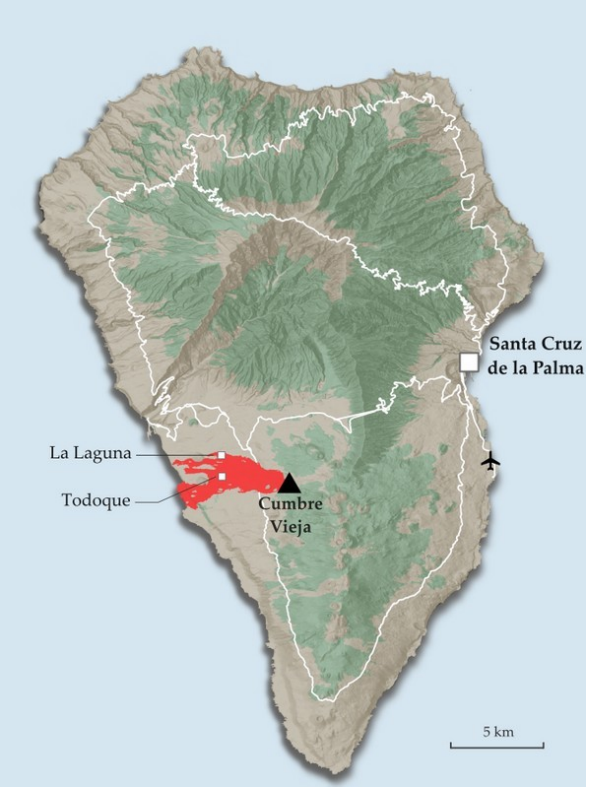
Firmado: **El Director Técnico de Guardia**
**Jorge Naranjo Borges**

**P.O., El Coordinador Multisectorial**
**Fernando Galván Rodríguez**

1.12
CANARIAS

CIVIL Y ATENCIÓN DE EMERGENCIAS DE LA COMUNIDAD AUTÓNOMA DE CANARIAS
DE FENÓMENOS METEOROLÓGICOS ADVERSOS (PEFMA)

# Eruzione del Cumbre Vieja



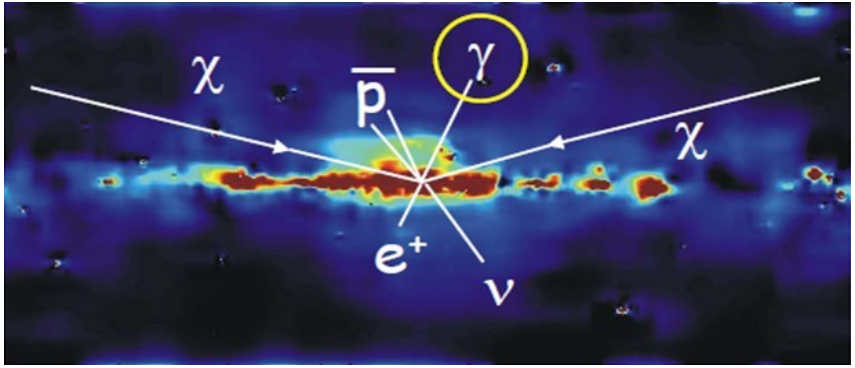

Dal 19 Settembre al  13 Dicembre 2021

# Cosa Osserviamo (la schedula)

I telescopi Cherenkov hanno un campo di vista (FOV) piccolo (4degX4deg) e devono essere puntati verso la sorgente.

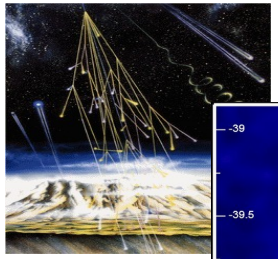
Le osservazioni sono proposte ogni anno a seguito di una “call”. Solo le migliori sono selezionate ed eseguite

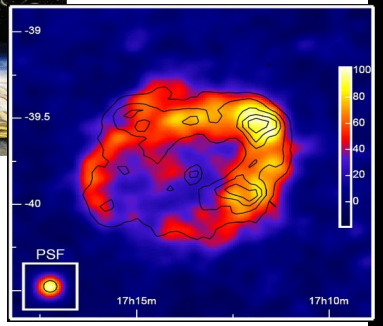
Il programma di osservazione è studiato nel dettaglio

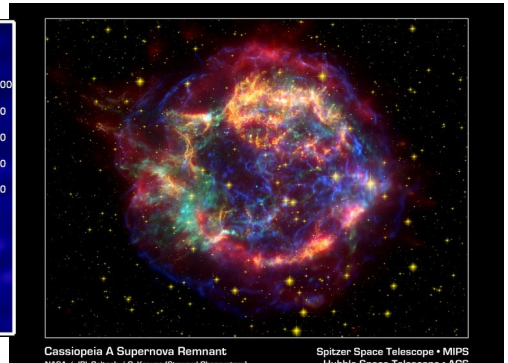



**Dark Matter Search (Discovery)**

**Cosmic Ray Origin**






**Super Massive Black Holes**

**Gamma-Ray Bursts**

# Osservazione a Sorpresa: i Transienti

## First-time detection of VHE gamma rays by MAGIC from a direction consistent with the recent EHE neutrino event IceCube-170922A

ATel #10817; Razmik Mirzoyan for the MAGIC Collaboration

on 4 Oct 2017; 17:17 UT

After the IceCube neutrino event EHE 170922A detected on 22/09/2017 (GCN circular #21916), Fermi-LAT measured enhanced gamma-ray emission from the blazar TXS 0506+056 (05 09 25.96370, +05 41 35.3279 (J2000), [Lani et al., Astron. J., 139, 1695-1712 (2010)]), located 6 arcmin from the EHE 170922A estimated direction (ATel #10791). MAGIC observed this source under good weather conditions and a 5 sigma detection above 100 GeV was achieved after 12 h of observations from September 28th till October 3rd. This is the first time that VHE gamma rays are measured from a direction consistent with a detected neutrino event. Several follow up observations from other observatories have been reported in ATels: #10773, #10787, #10791, #10792, #10794, #10799, #10801, GCN: #21941, #21930, #21924, #21923, #21917, #21916. The MAGIC contact persons for these observations are R. Mirzoyan (Razmik.Mirzoyan@mpp.mpg.de) E. Bernardini (elisa.bernardini@desy.de), K.Satalecka (konstancja.satalecka@desy.de). MAGIC is a system of two 17m-diameter Imaging Atmospheric Cherenkov Telescopes located at the Observatory Roque de los Muchachos on the Canary island La Palma, Spain, and designed to perform gamma-ray astronomy in the energy range from 50 GeV to greater than 50 TeV.

## First time detection of a GRB at sub-TeV energies; MAGIC detects the GRB 190114C

ATel #12390; Razmik Mirzoyan on behalf of the MAGIC Collaboration

on 15 Jan 2019; 01:03 UT

The MAGIC telescopes performed a rapid follow-up observation of GRB 190114C (Gropp et al., GCN 23688; Tyurina et al., GCN 23690, de Ugarte Postigo et al., GCN 23692, Lipunov et al. GCN 23693, Selsing et al. GCN 23695). This observation was triggered by the Swift-BAT alert; we started observing at about 50s after Swift T0: 20:57:03.19. The MAGIC real-time analysis shows a significance >20 sigma in the first 20 min of observations (starting at T0+50s) for energies >300GeV. The relatively high detection threshold is due to the large zenith angle of observations (>60 degrees) and the presence of partial Moon. Given the brightness of the event, MAGIC will continue the observation of GRB 190114C until it is observable tonight and also in the next days. We strongly encourage follow-up observations by other instruments. The MAGIC contact persons for these observations are R. Mirzoyan (Razmik.Mirzoyan@mpp.mpg.de) and K. Noda (nodak@icrr.u-tokyo.ac.jp). MAGIC is a system of two 17m-diameter Imaging Atmospheric Cherenkov Telescopes located at the Observatory Roque de los Muchachos on the Canary island La Palma, Spain, and designed to perform gamma-ray astronomy in the energy range from 50 GeV to greater than 50 TeV.

# Osservazione a Sorpresa: i Transienti

https://www.youtube.com/watch?v=Mkb3qRasxUg

# Saluti dal Roque