

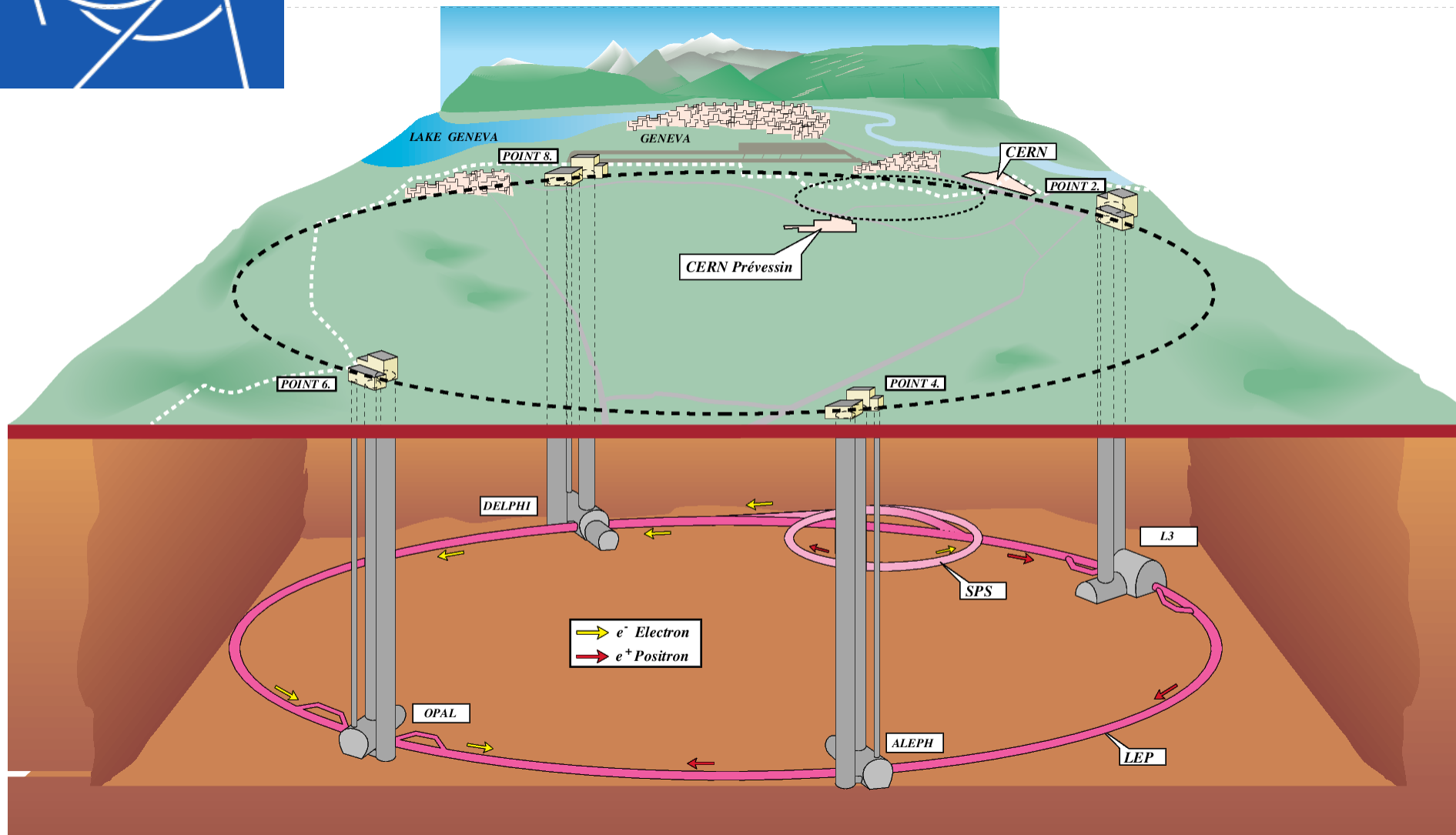
19. maj 2022 ob 19h
Vipava, Dvorec Lanthieri
**Novi teleskopi za opazovanje
visokoenergijskega vesolja**

prof. dr. Samo Stanič
(Center za astrofiziko in kozmologijo, UNG) in
Renata Dacinger



Veliki trkalnik elektronov in pozitronov (LEP)

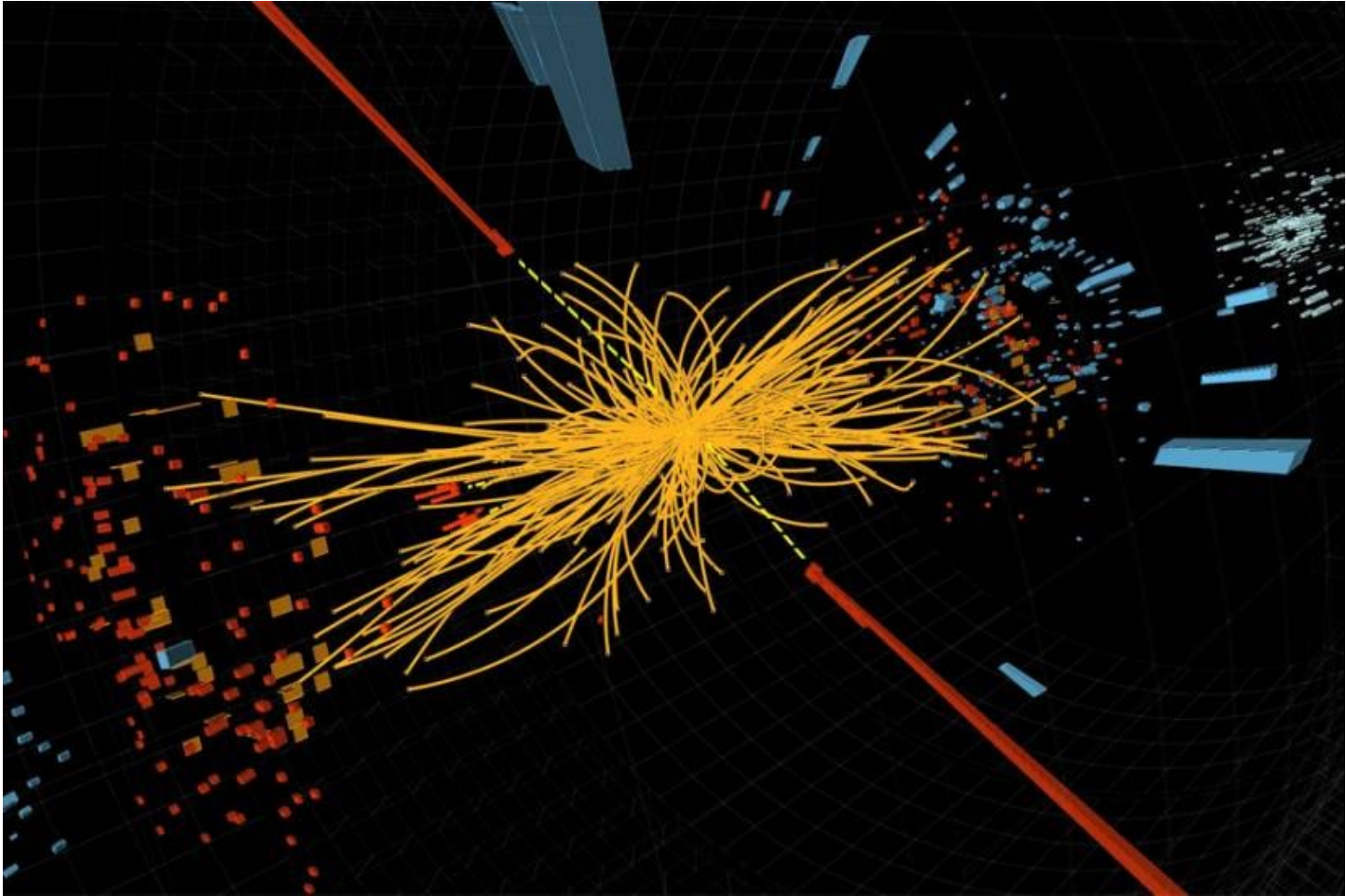
Deloval od 1989 do 2000, obseg 26 km, najvišja težiščna energija 209 GeV

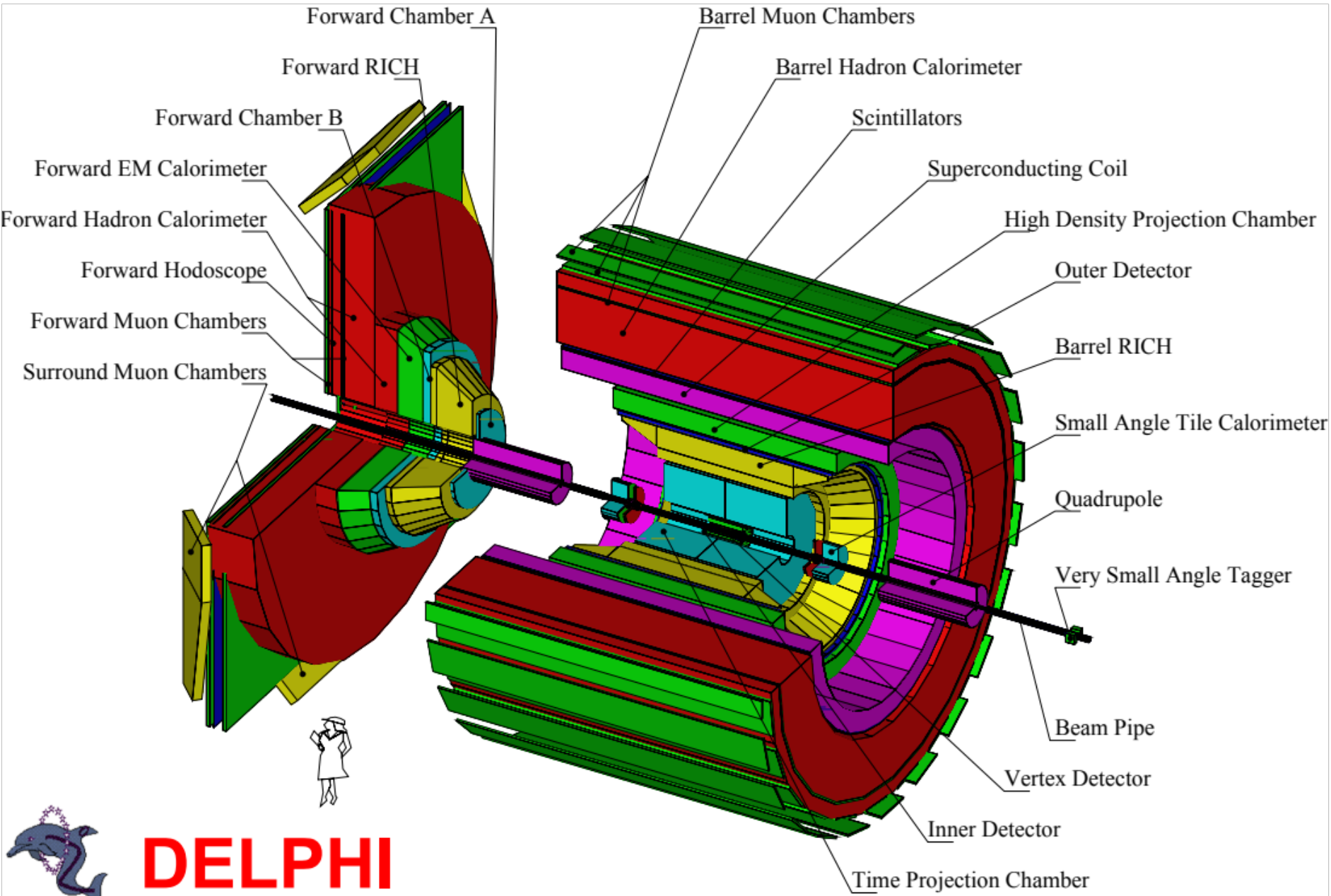




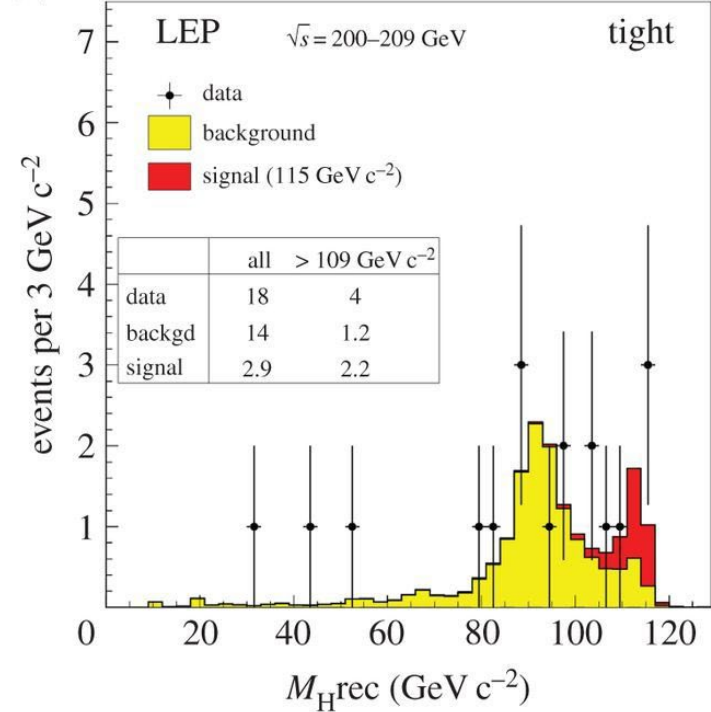
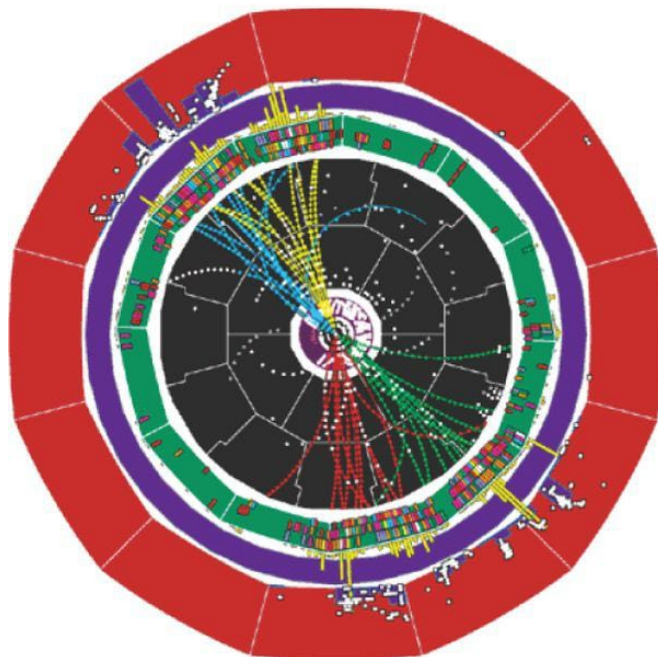
Trkalnik KEKB, Japonska, 2003

Primer trka dveh protonov v trkalniku LHC

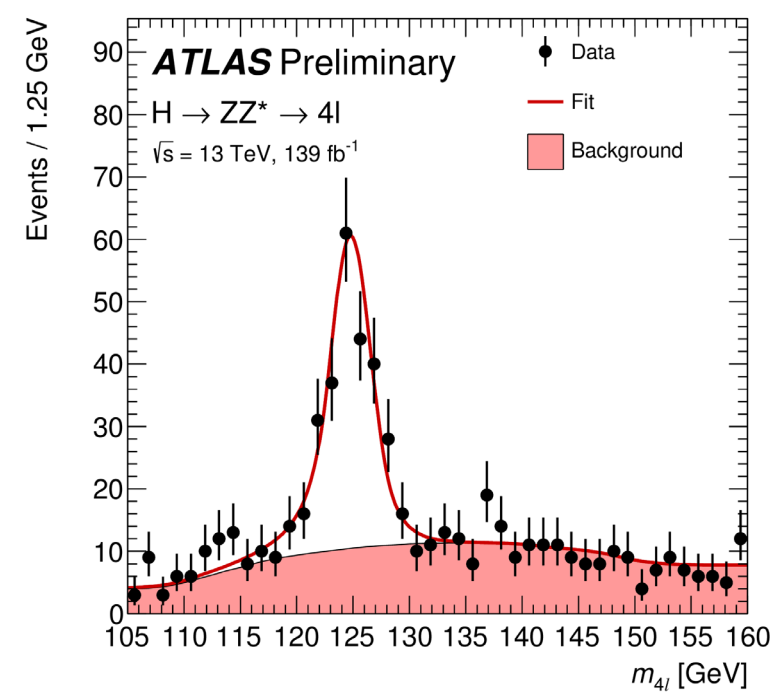
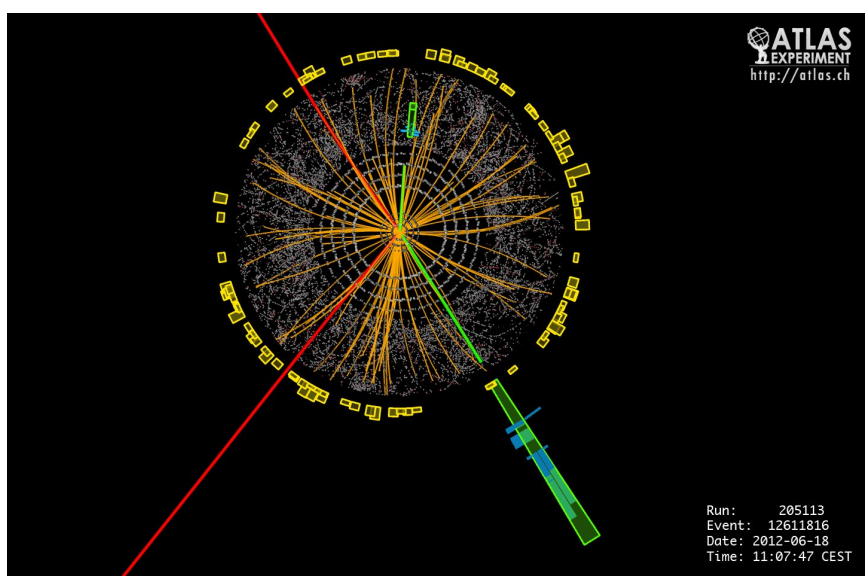




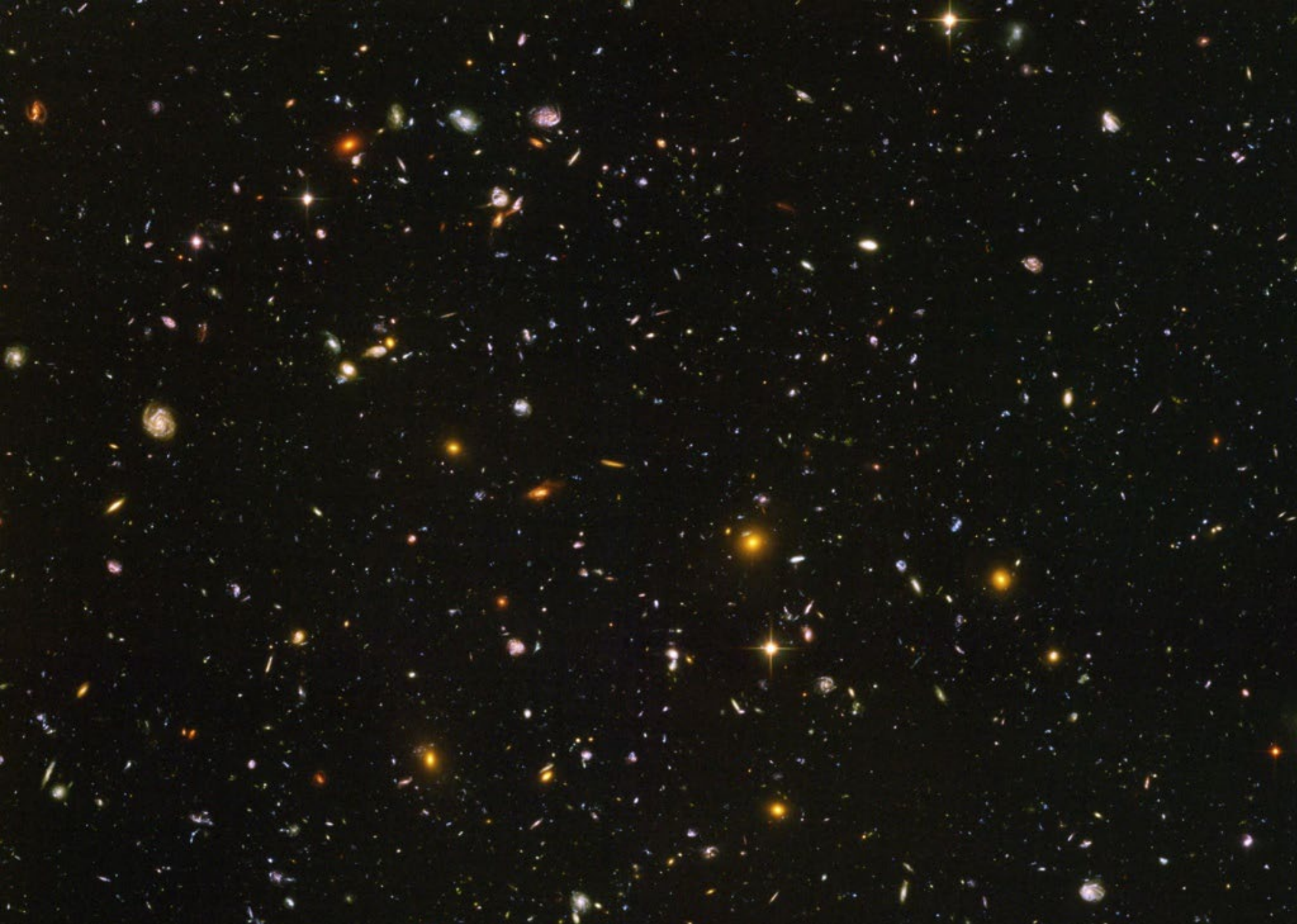
DELPHI



Measurement of the Higgs boson mass in the $H \rightarrow ZZ^* \rightarrow 4\ell$ decay channel with $\sqrt{s} = 13 \text{ TeV}$ pp collisions using the ATLAS detector at the LHC, ATLAS-CONF-2020-005



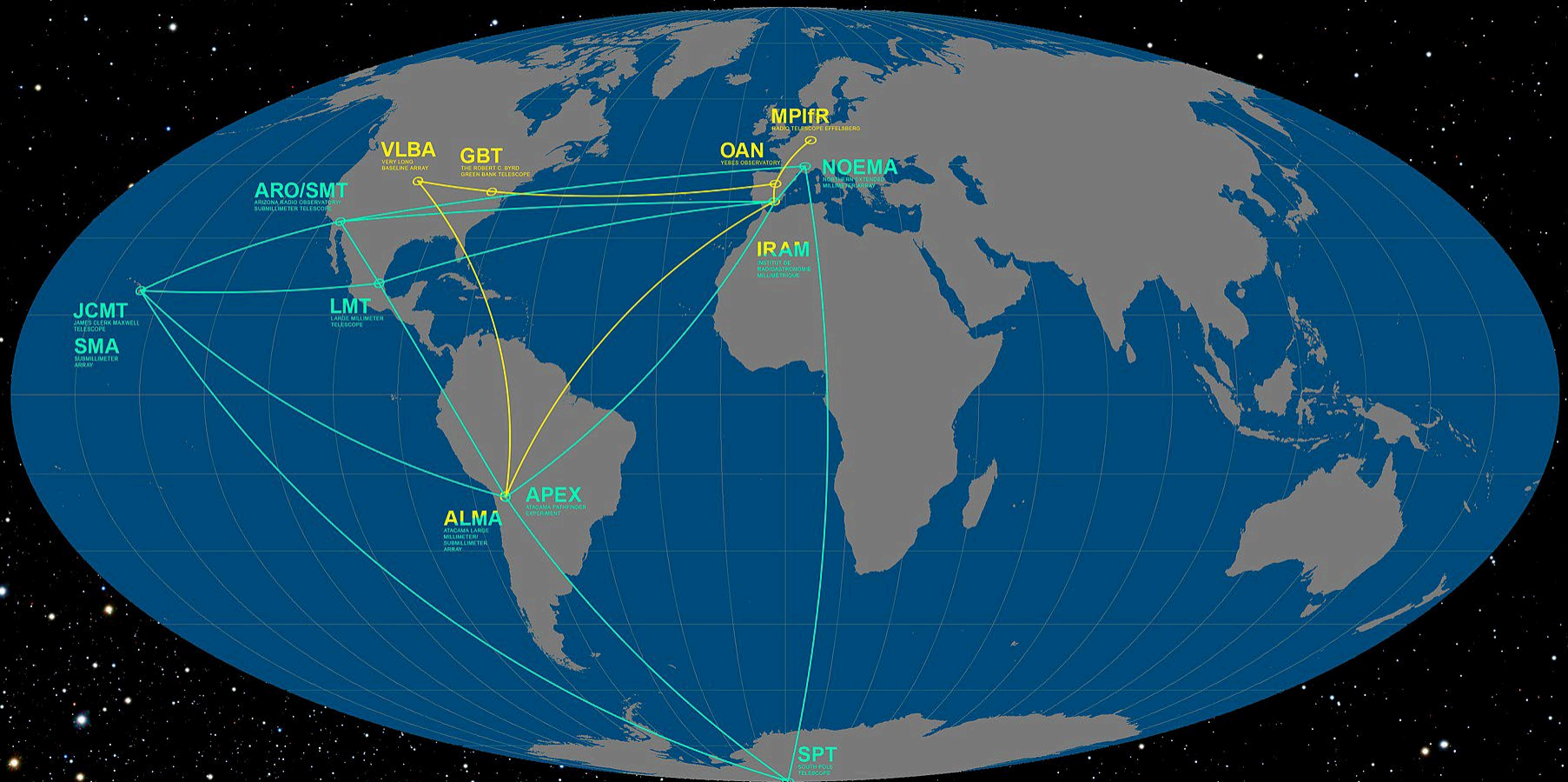




Predstava vesolja danes (Hubble Space Telescope)

Event Horizon Telescope – globalno polje radijskih teleskopov

ESO/O. Furtak - <https://www.eso.org/public/images/ann17015a/>



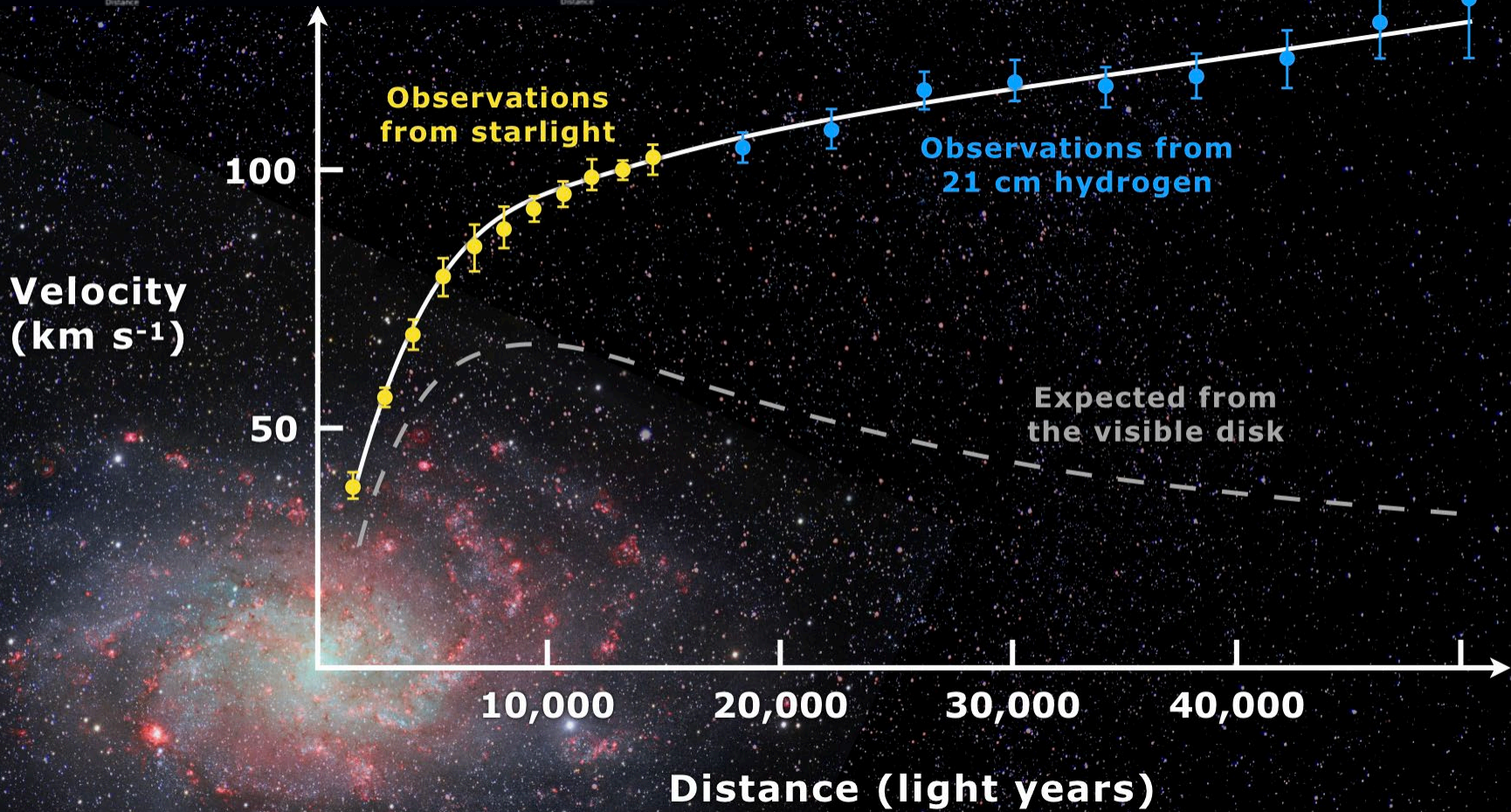
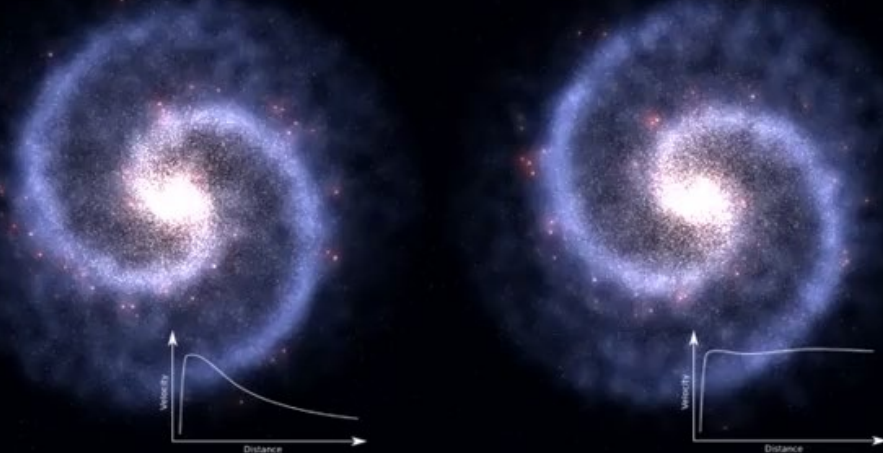
Posnetek okolice črne luknje Strelec A* v središču naše galaksije

Event Horizon Telescope (12.5.2022)



Temna snov

(iz lastnosti vrtenja galaksij)



Večglasniška astrofizika

elektromagnetno valovanje, delci in gravitacijski valovi

Vidna svetloba



GTC, La Palma

Radijski valovi

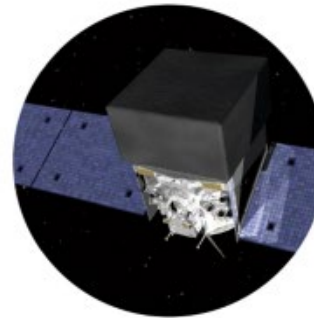


Gravitational waves



LIGO

γ -rays



Fermi

γ -rays



MAGIC

Cosmic rays



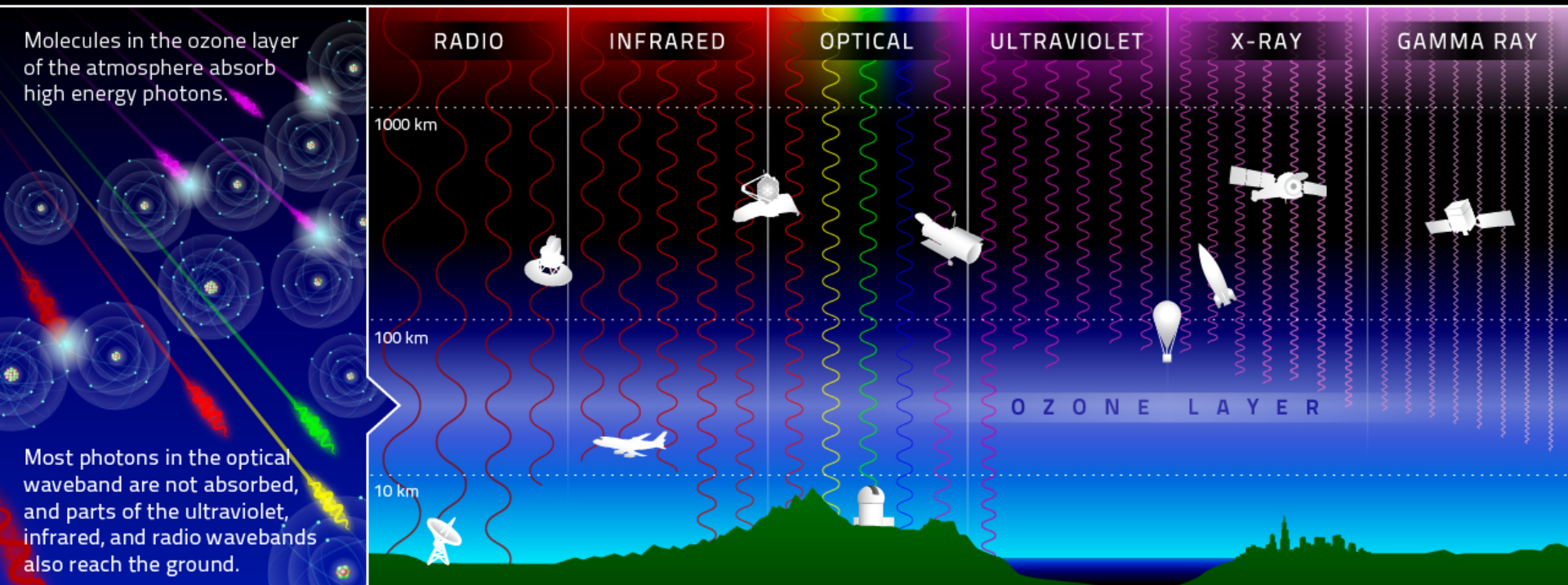
Pierre Auger Observatory

Neutrinos

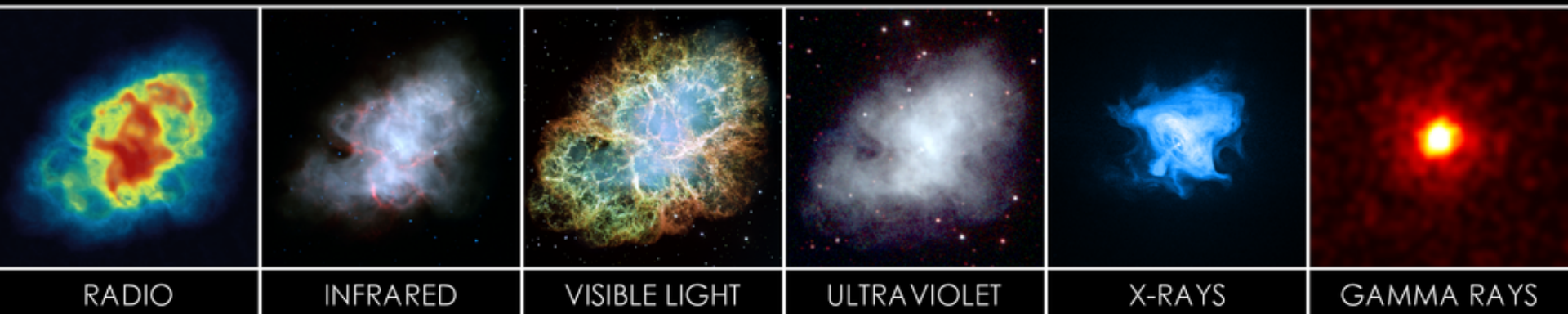


IceCube

MULTIWAVELENGTH LAND & SPACE BASED OBSERVATORIES



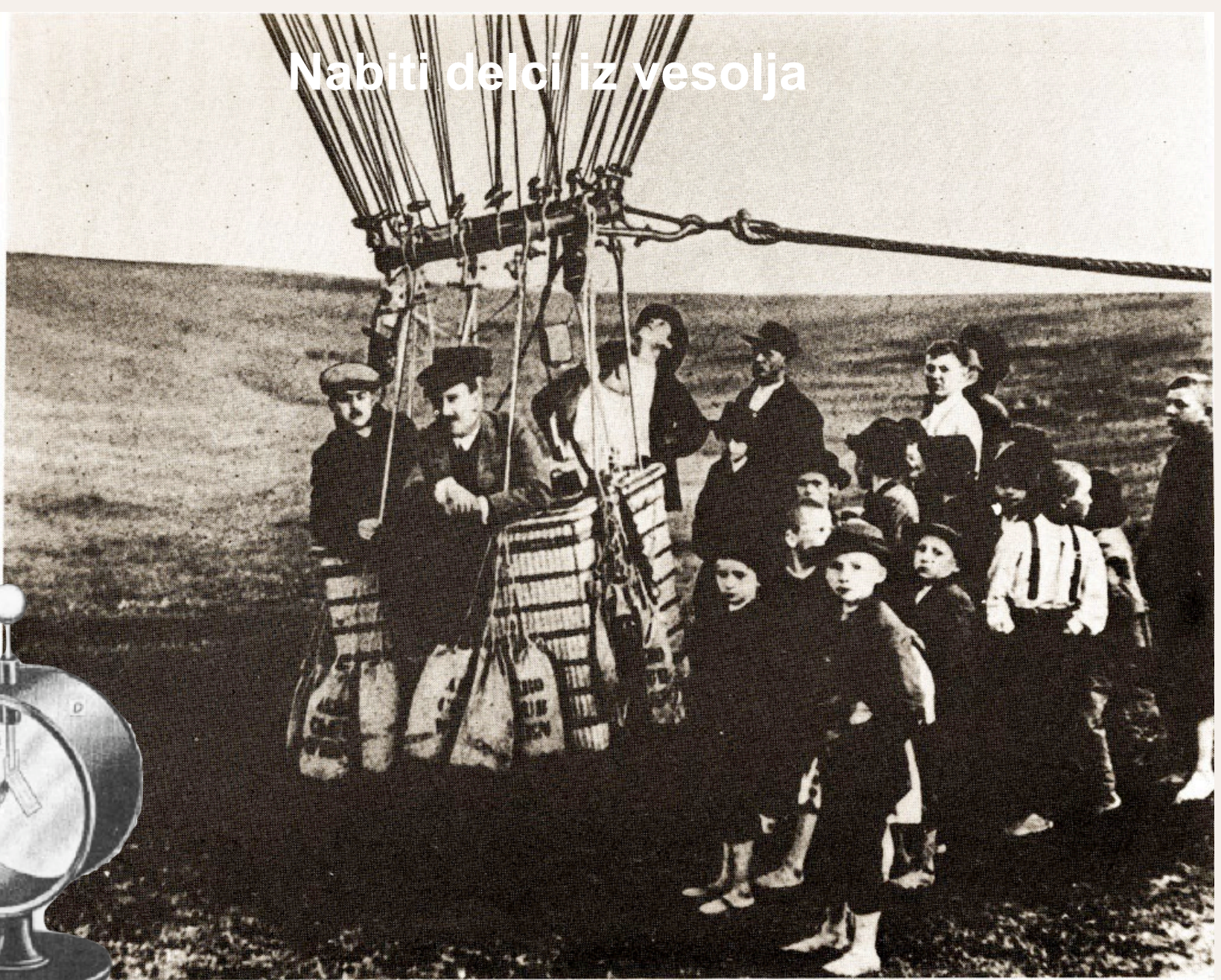
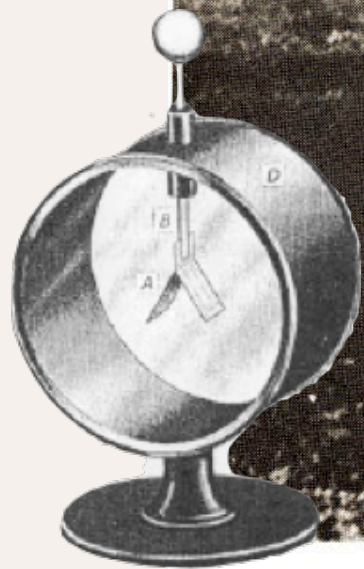
CRAB NEBULA



The crab nebula in radio, infrared, visible, ultraviolet, x-ray and gamma-ray wavelengths.

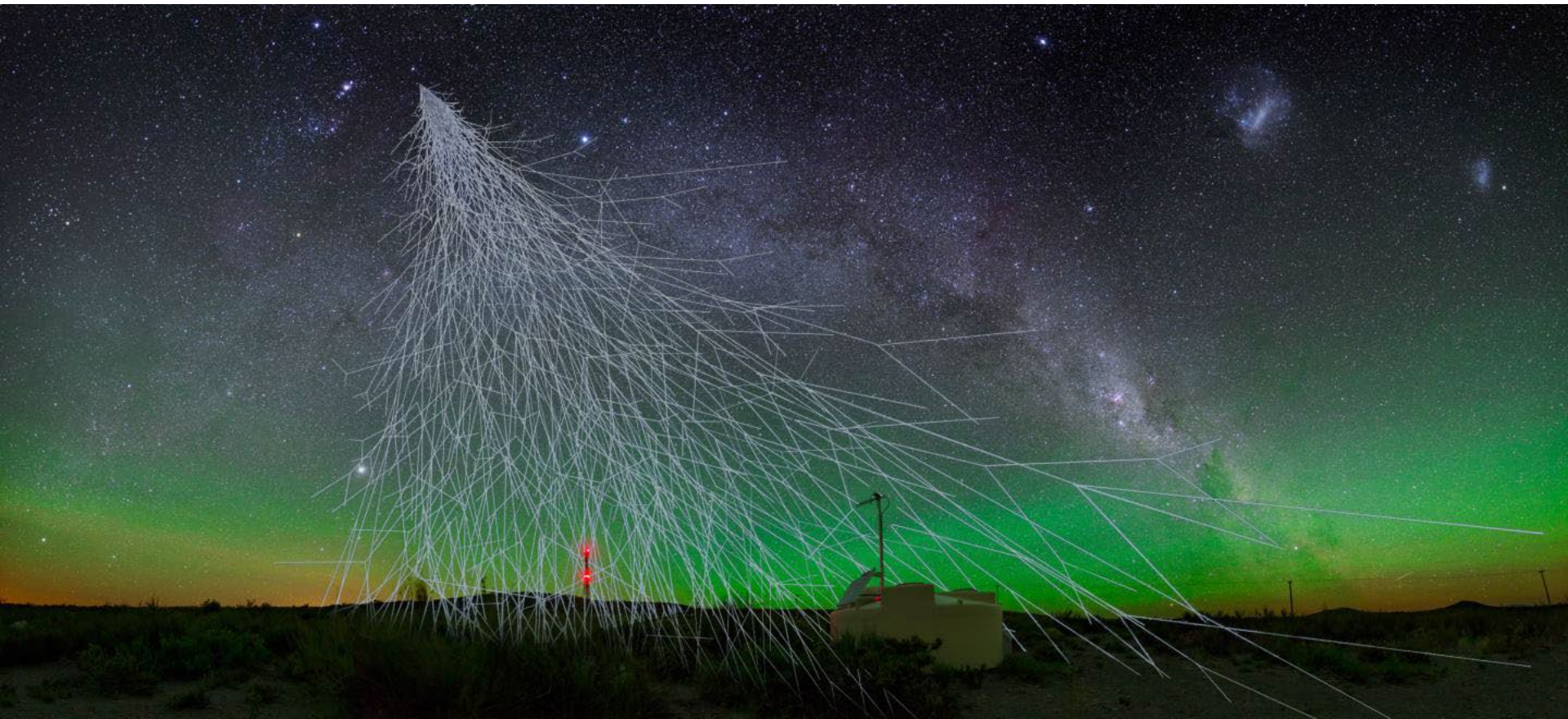
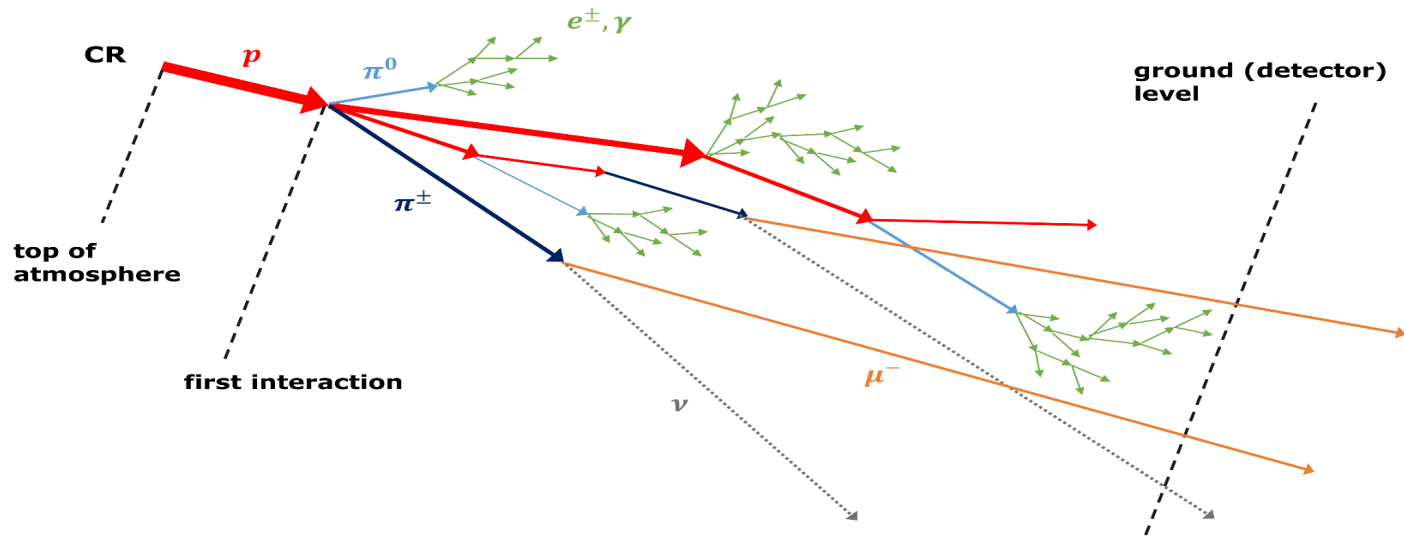
Sources: Radio: NRAO/AUI and M. Bietenholz, J.M. Uson, T.J. Cornwell; Infrared: NASA/JPL-Caltech/R. Gehrz (University of Minnesota); Visible: NASA, ESA, J. Hester and A.Loll (Arizona State University); Ultraviolet: NASA/Swift/E. Hoversten, PSU, X-ray: NASA/CXC/SAO/F. Seward et al.; Gamma: NASA/DOE/Fermi LAT/R. Buehler

Nabiti delci iz vesolja

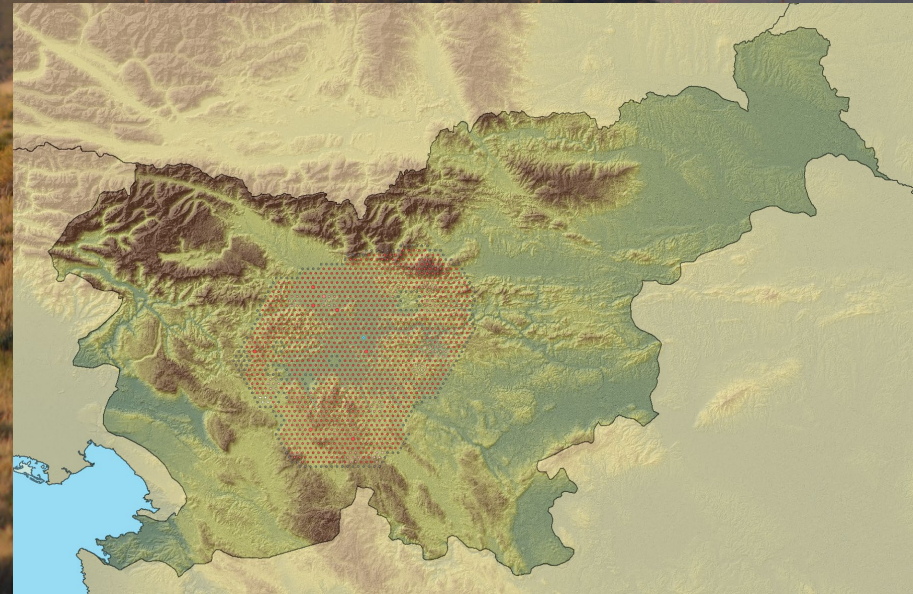


Hess on gondola in 1912 probably in test flight. The date and place is not clear at present.

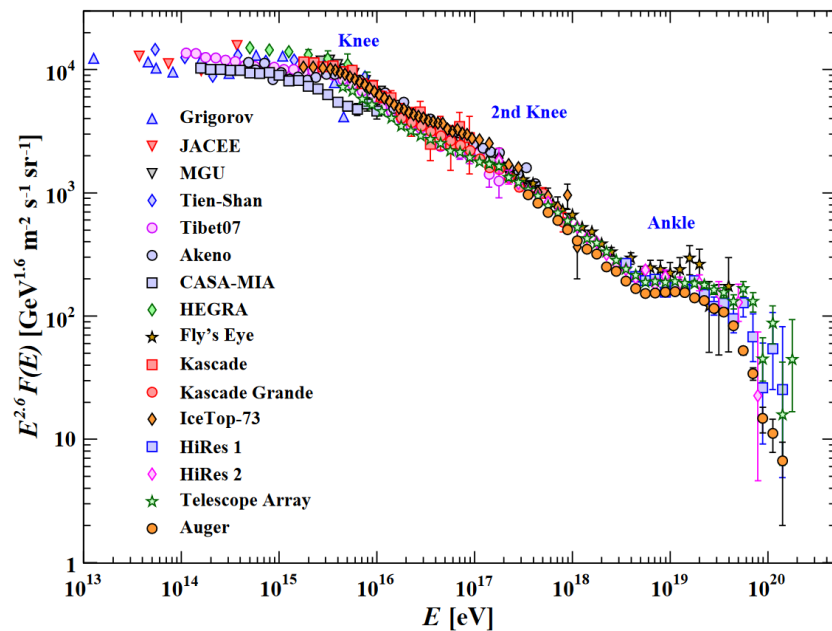
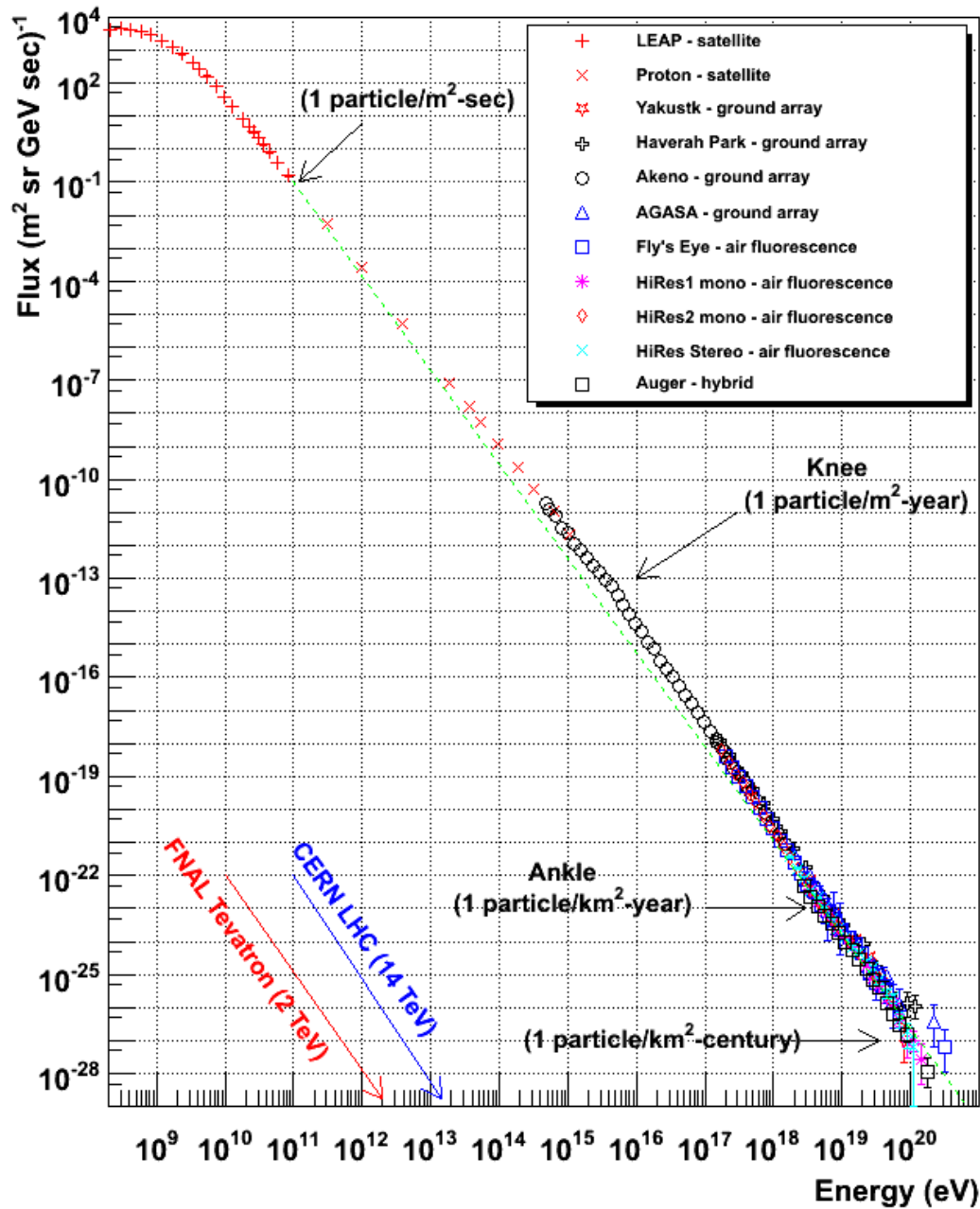
Kozmični delci visokih energij in Atmosferski plazovi



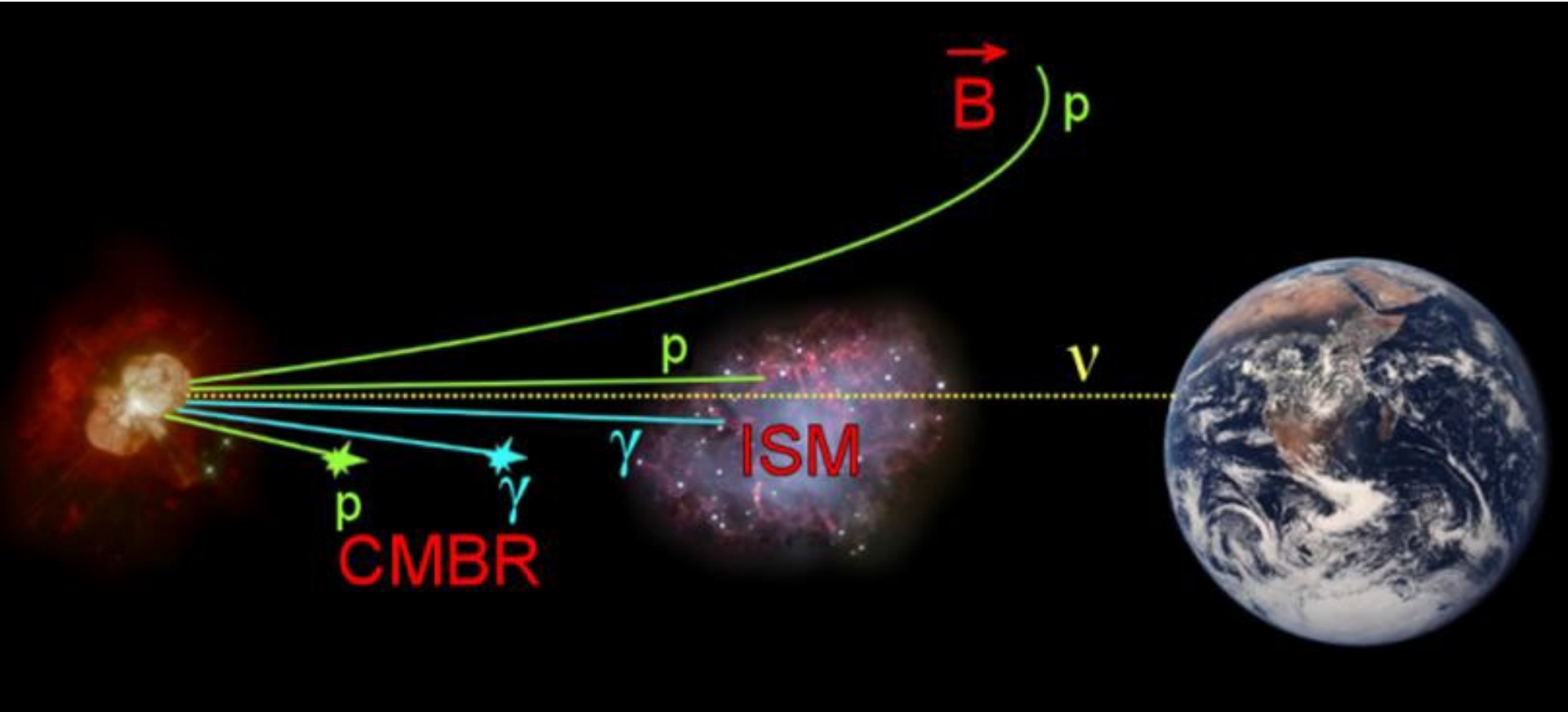
Observatorij za kozmične delce ekstremnih energij »Pierre Auger« v Argentini



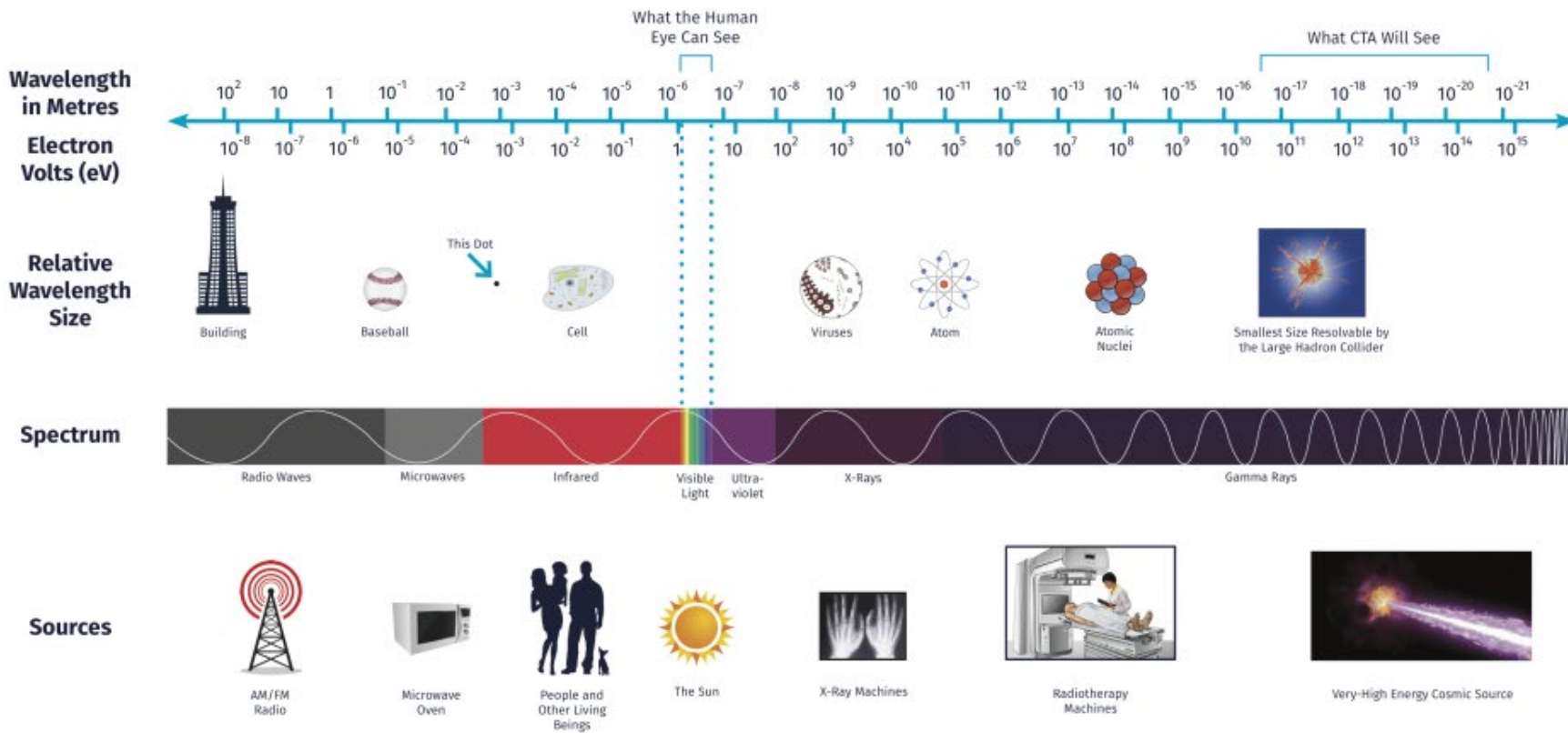
Cosmic Ray Spectra of Various Experiments



Različni glasniki prispevajo komplementarne informacije

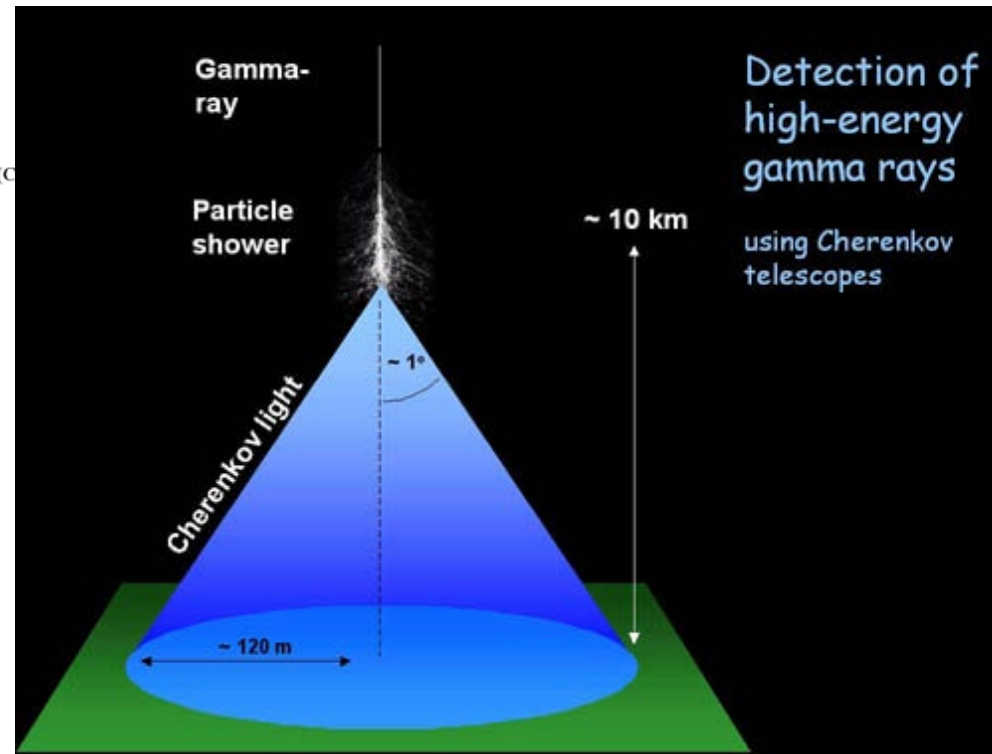
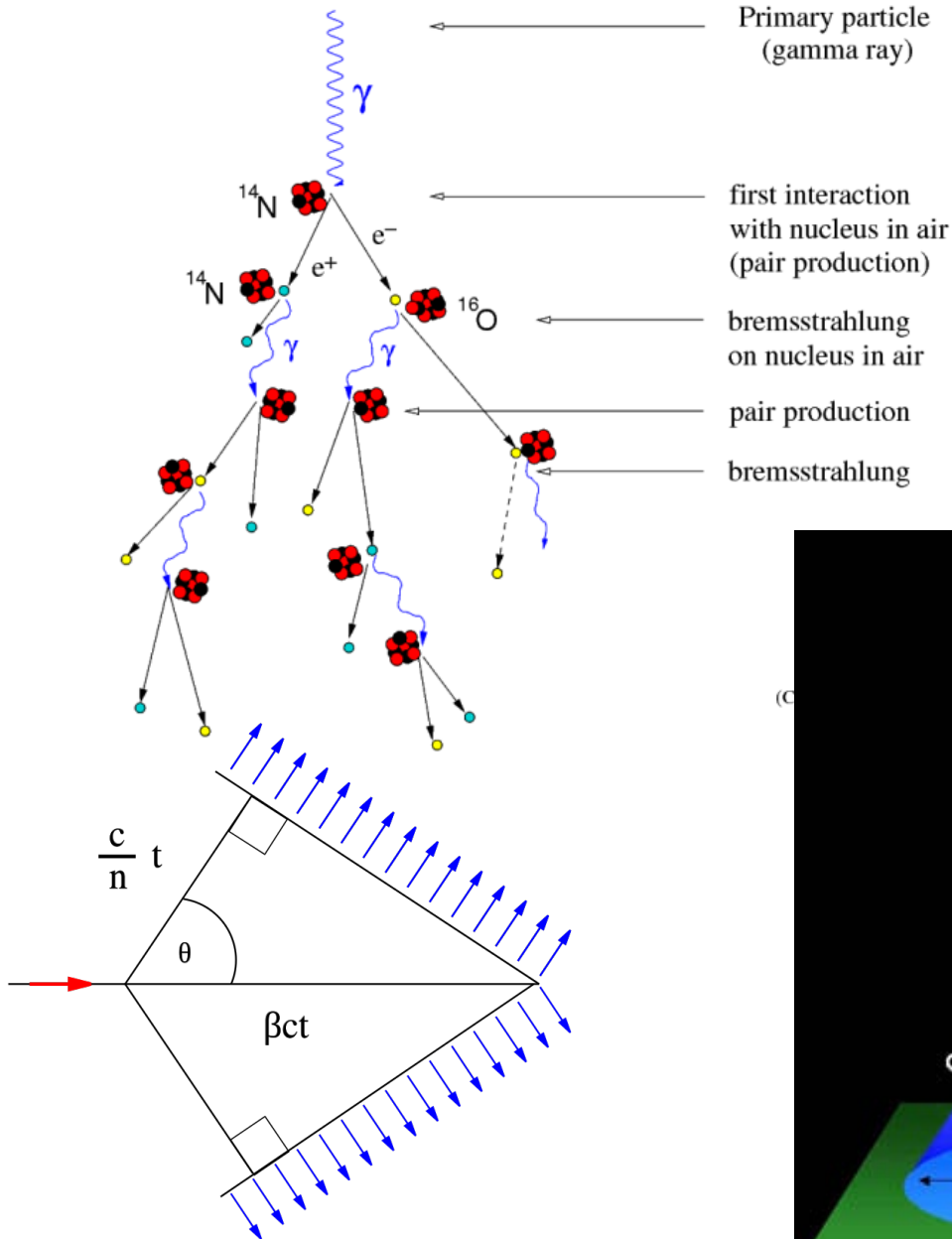


The Electromagnetic Spectrum

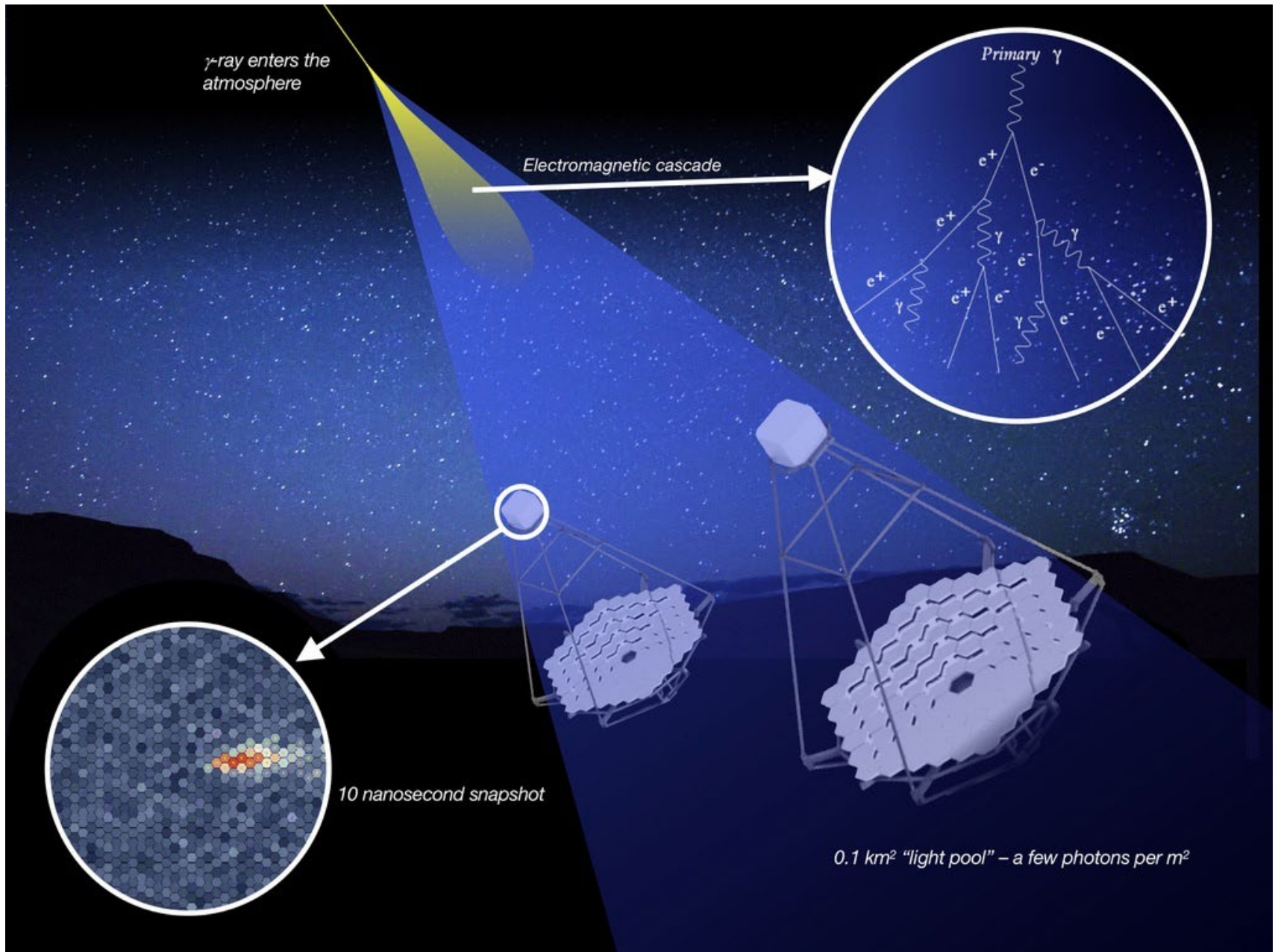


Zakaj pride do svetlobnih bliskov v ozračju

ob vpadu visokoenergijskega sevanja gama?



Teleskop Čerenkova



Delovanje teleskopa Čerenkova



Izgleda kot sled meteorja
Zelo šibka (few photons per m^2)
Zelo kratek čas (okoli 10^{-9} s)

Slika neba v vidni svetlobi

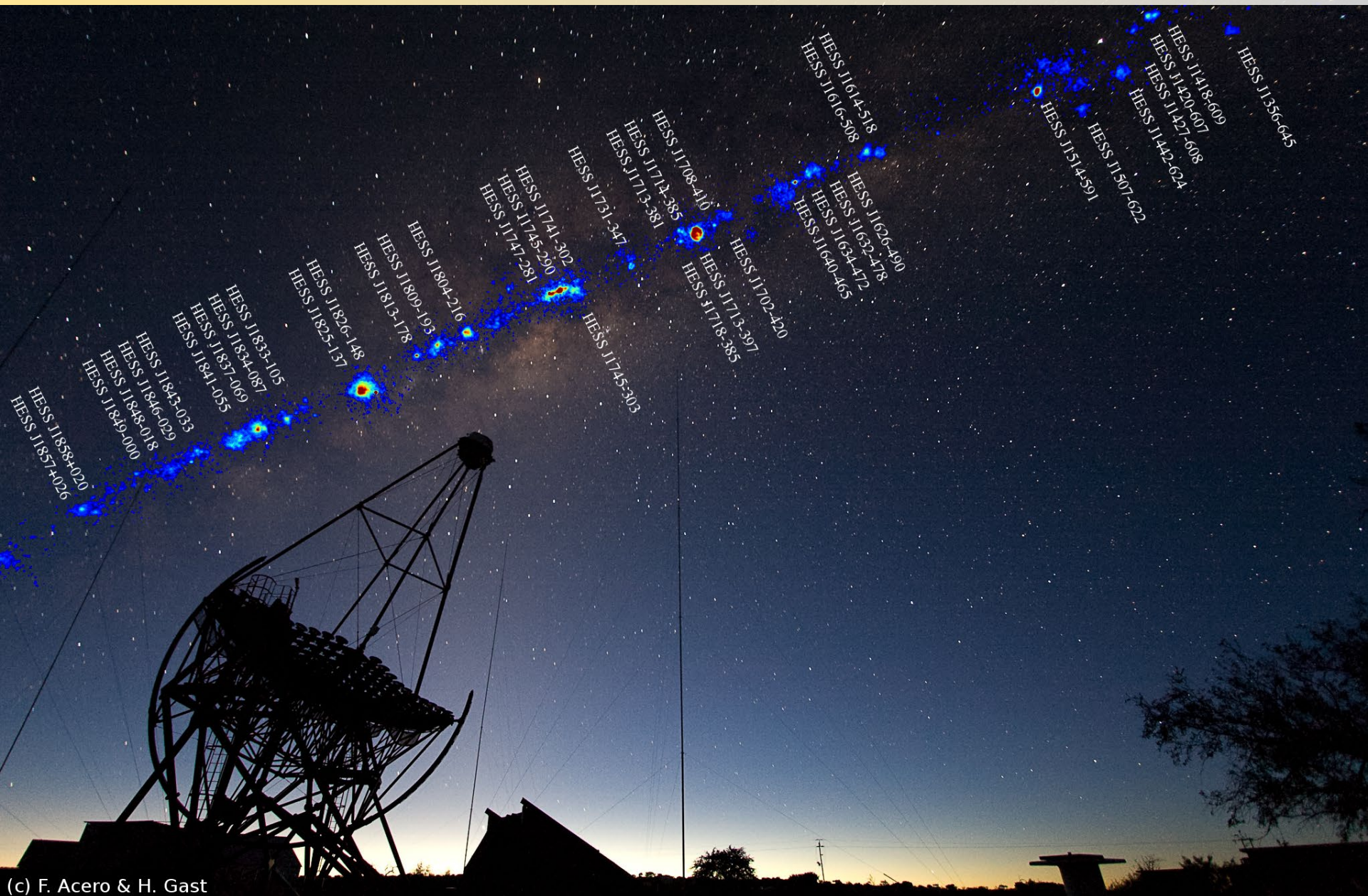


Slika neba z visokoenergijskim sevanjem gama



Svetloba pri teh energijah
iz netermalnih procesov

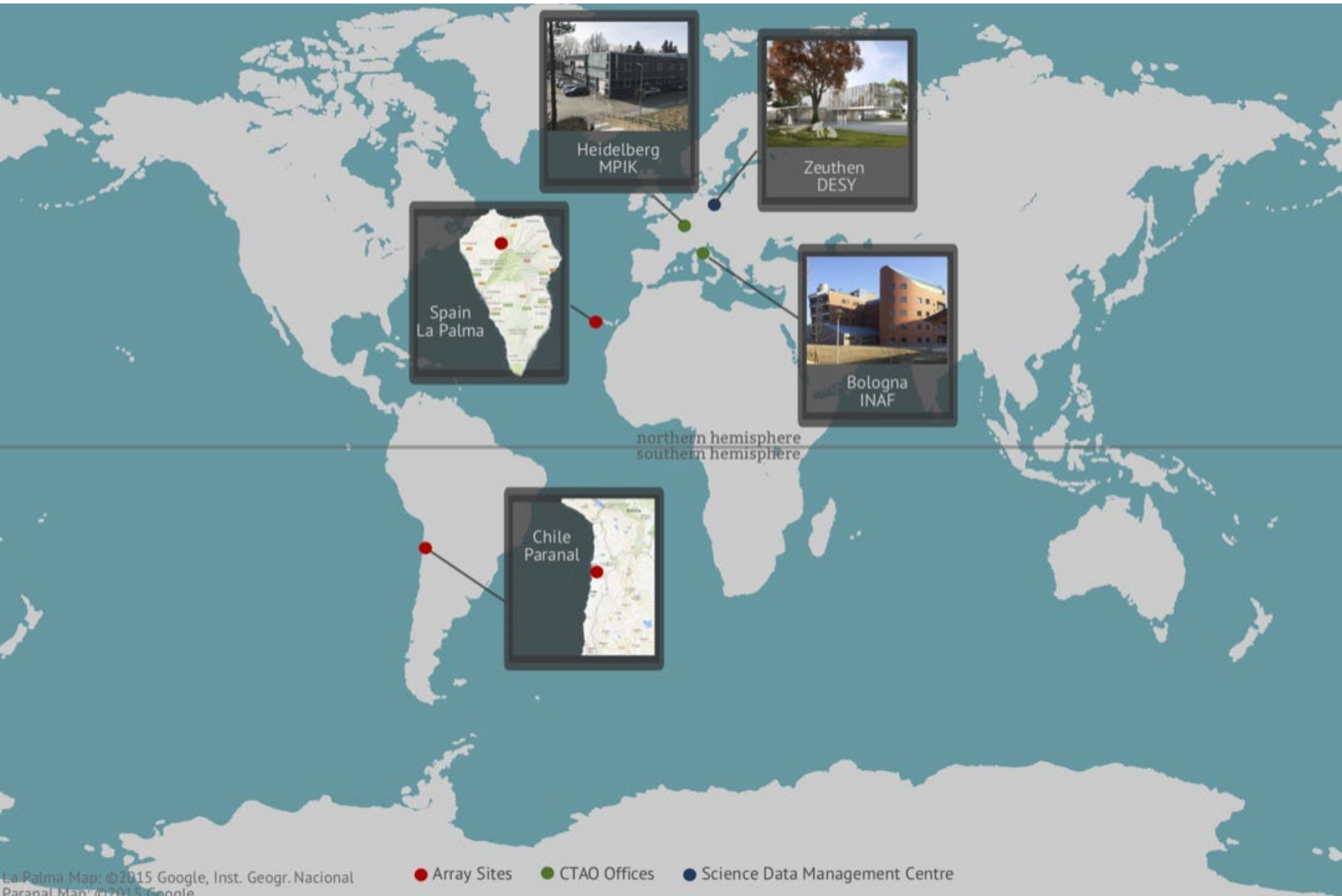
Možna je identifikacija izvorov



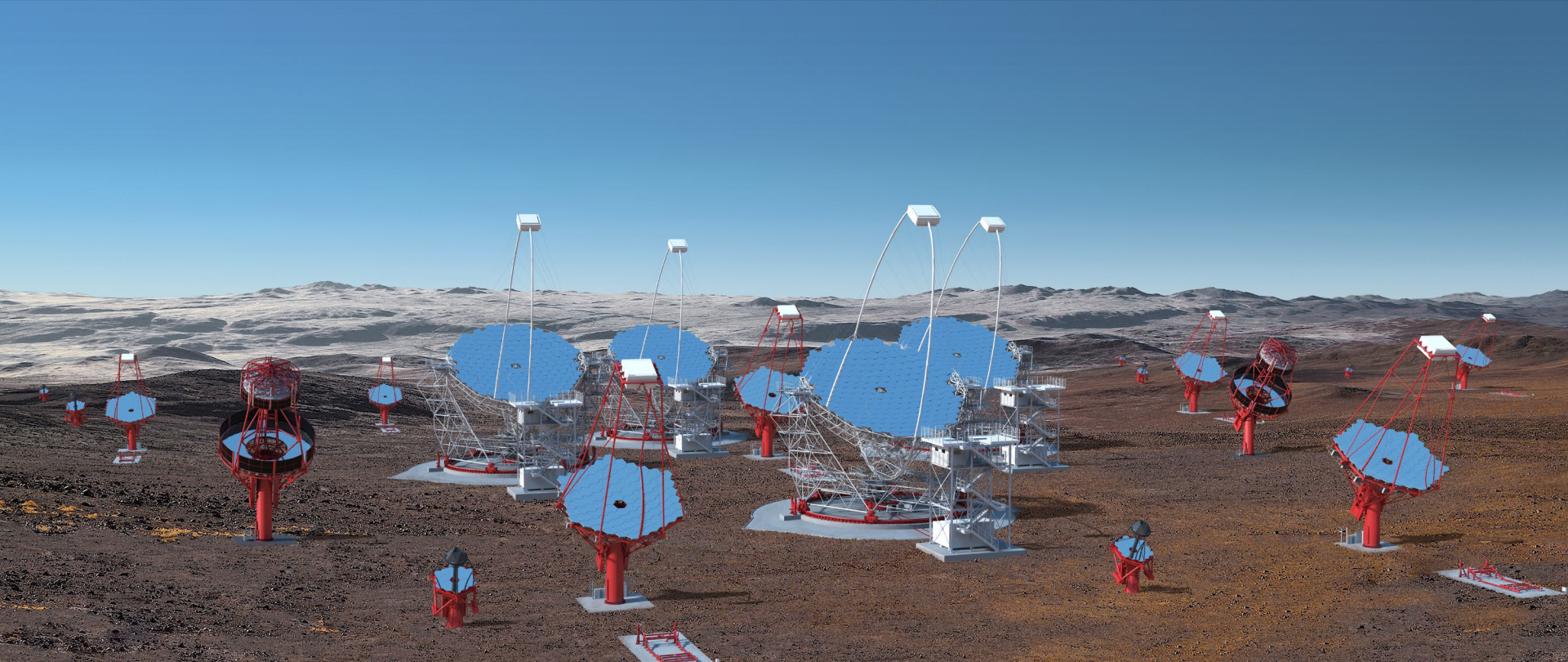
(c) F. Acero & H. Gast

Observatorij Cherenkov Telescope Array

polje teleskopov Čerenkova, ki bo pokrilo celotno nebo



Dve Lokaciji CTA – La Palma in Čile



La Palma – stabilni atmosferski pogoji, ni onesnaženja





Roque de Los Muchachos

Altitud 2426 m.

Observatorij Roque de Los Muchachos



Prvi teleskop CTA (LST-1) in obstoječa teleskopa eksperimenta MAGIC



Observatorij Roque de Los Muchachos

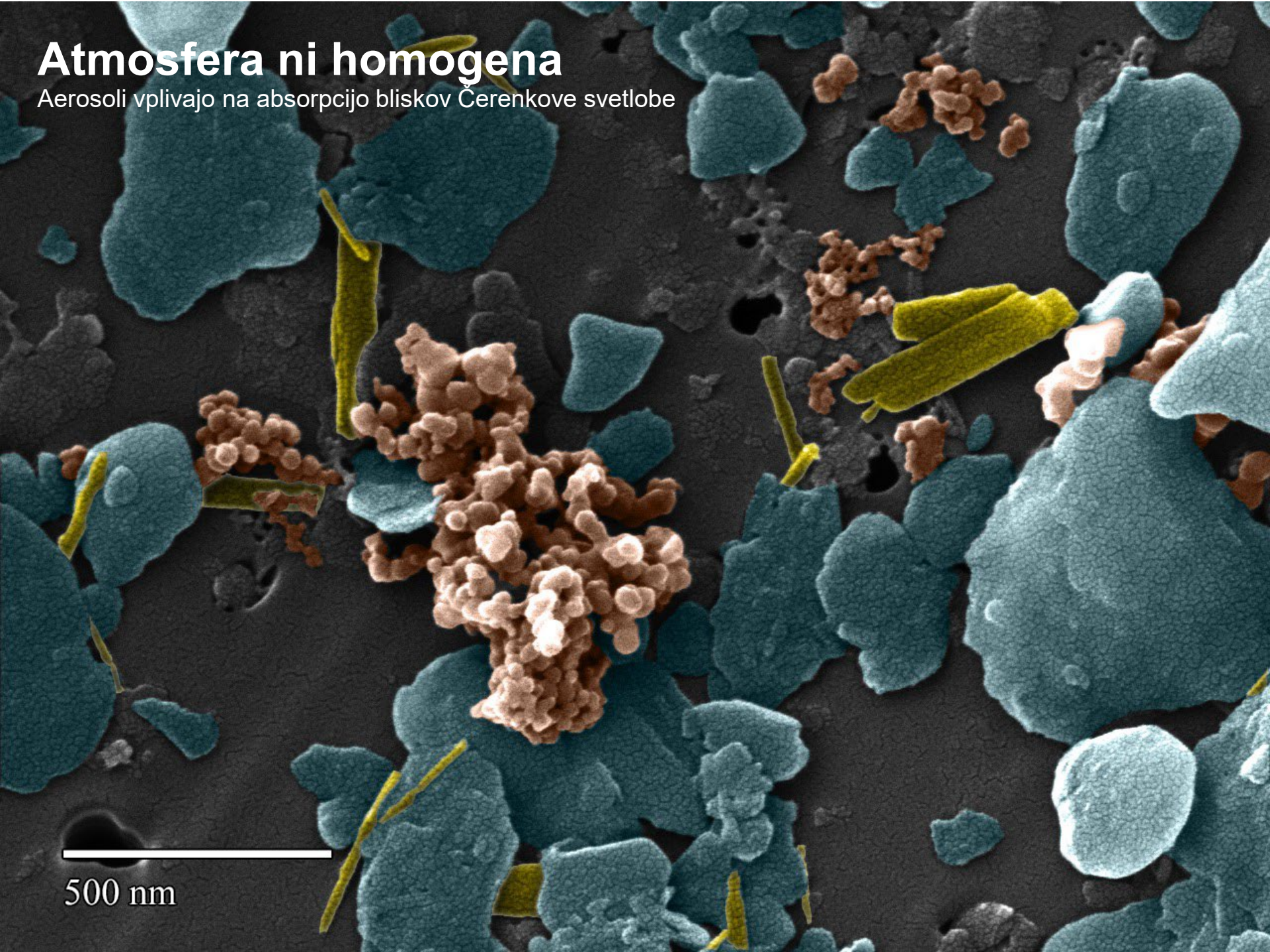


Prvi teleskop observatorija CTA na La Palmi



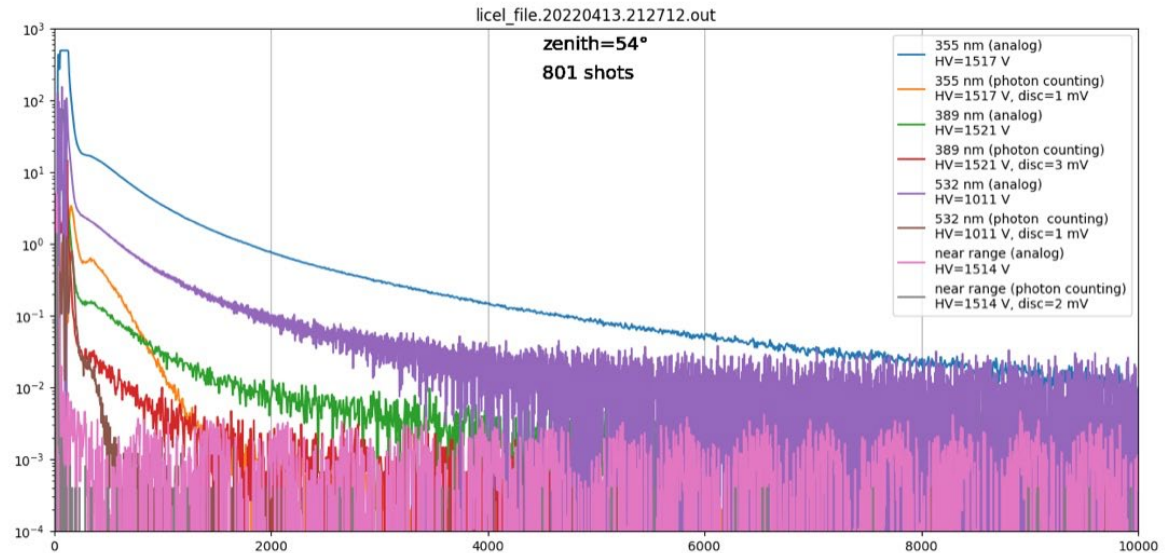
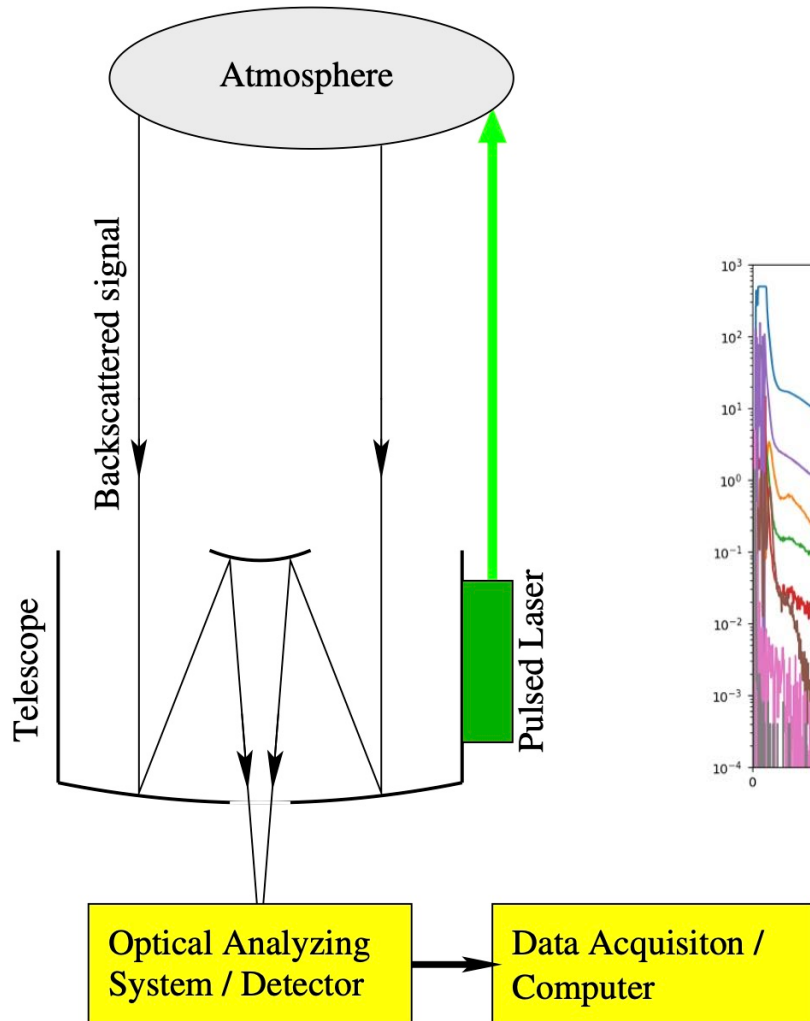
Atmosfera ni homogena

Aerosoli vplivajo na absorpcijo bliskov Čerenkove svetlobe



500 nm

LIDAR – daljinsko zaznavanje atmosferskih lastnosti



Naš lidar na La Palmi (februar 2021 – maj 2022)





Izbruh Cumbre Vieja 19.9.2021





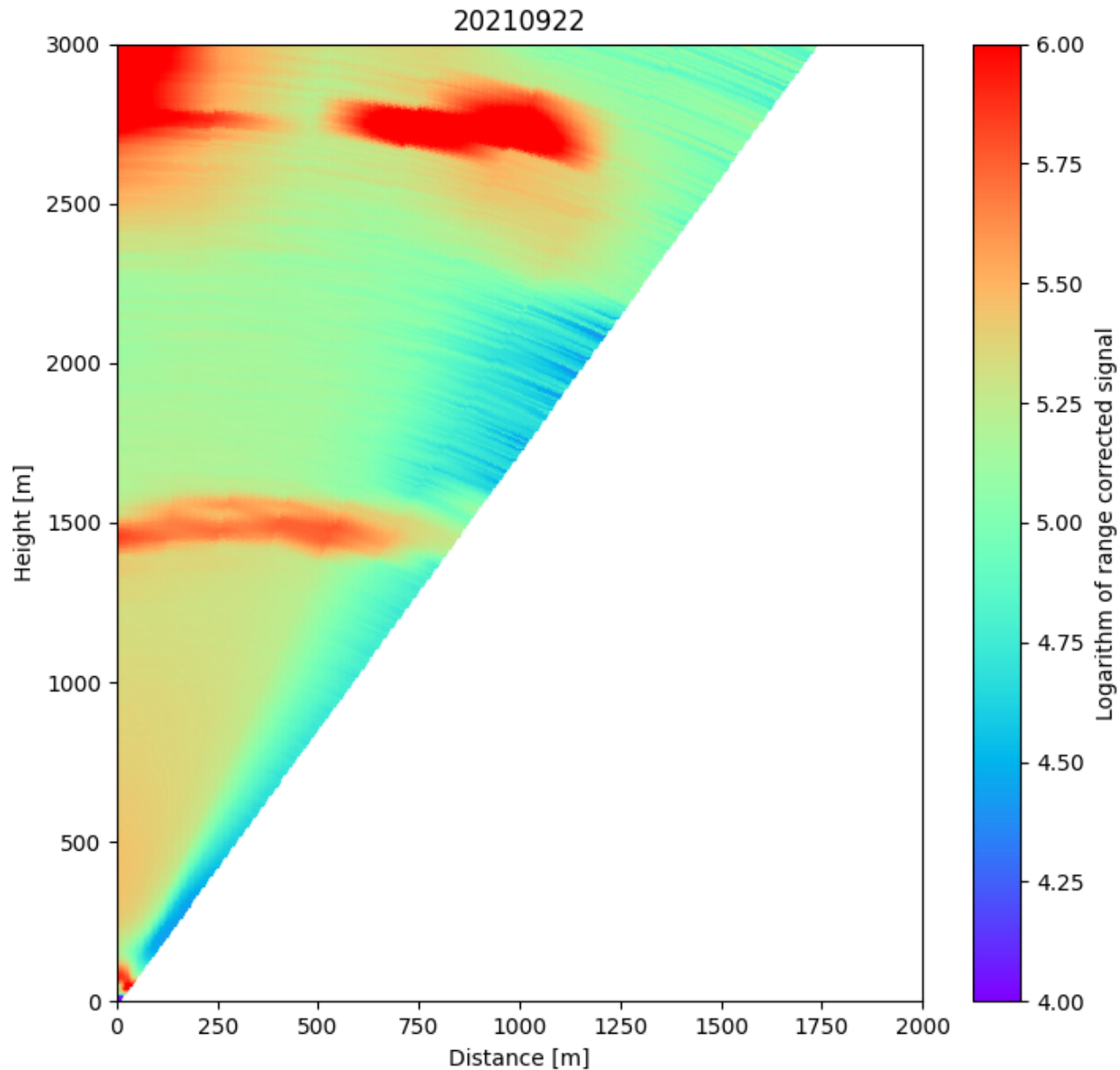
Še se kadi



Lava v Los Llanos



Plasti vulkanskega pepela so razvidne iz meritev



Lidar gre nazaj v laboratorije za dokončne izboljšave



NAPOVED

9. junij 2022 ob 19ih
Vipava, Dvorec Lanthieri

prof. dr. Matjaž Valant
(Laboratorij za raziskave materialov, UNG) in
Renata Dacinger