Experiencias en Física de Altas Energías

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Definamos la alta energía

$$E_{\mathrm{P}} = \sqrt{\frac{\hbar c^5}{G}} \approx 1.956 \times 10^9 \text{ J} \approx 1.22 \times 10^{28} \text{ eV} \approx 0.5433 \text{ MWh}$$

Energía máxima asumiendo la validez de la física conocida, límite energético donde la teoría cuántica de campos del modelo Estándar no es compatible con la relatividad general.

1 keV = 10^3 eV

1 MeV = 10^3 keV = 10^6 eV

1 GeV = 10^3 MeV = 10^9 eV

1 TeV = 10^3 GeV = 10^{12} eV

1 PeV = 10^3 TeV = 10^{15} eV

1 EeV = 10^3 PeV = 10^{18} eV

Unidades de energía

La pseudo-ciencia…….

WEIRD NEWS 08/19/2016 03:17 am ET

Video Of ‘Satanic Ritual’ At World’s Most Famous Physics Lab Is A Hoax

CERN employees “sometimes let their sense of humor go too far.”

By Ed Mazza

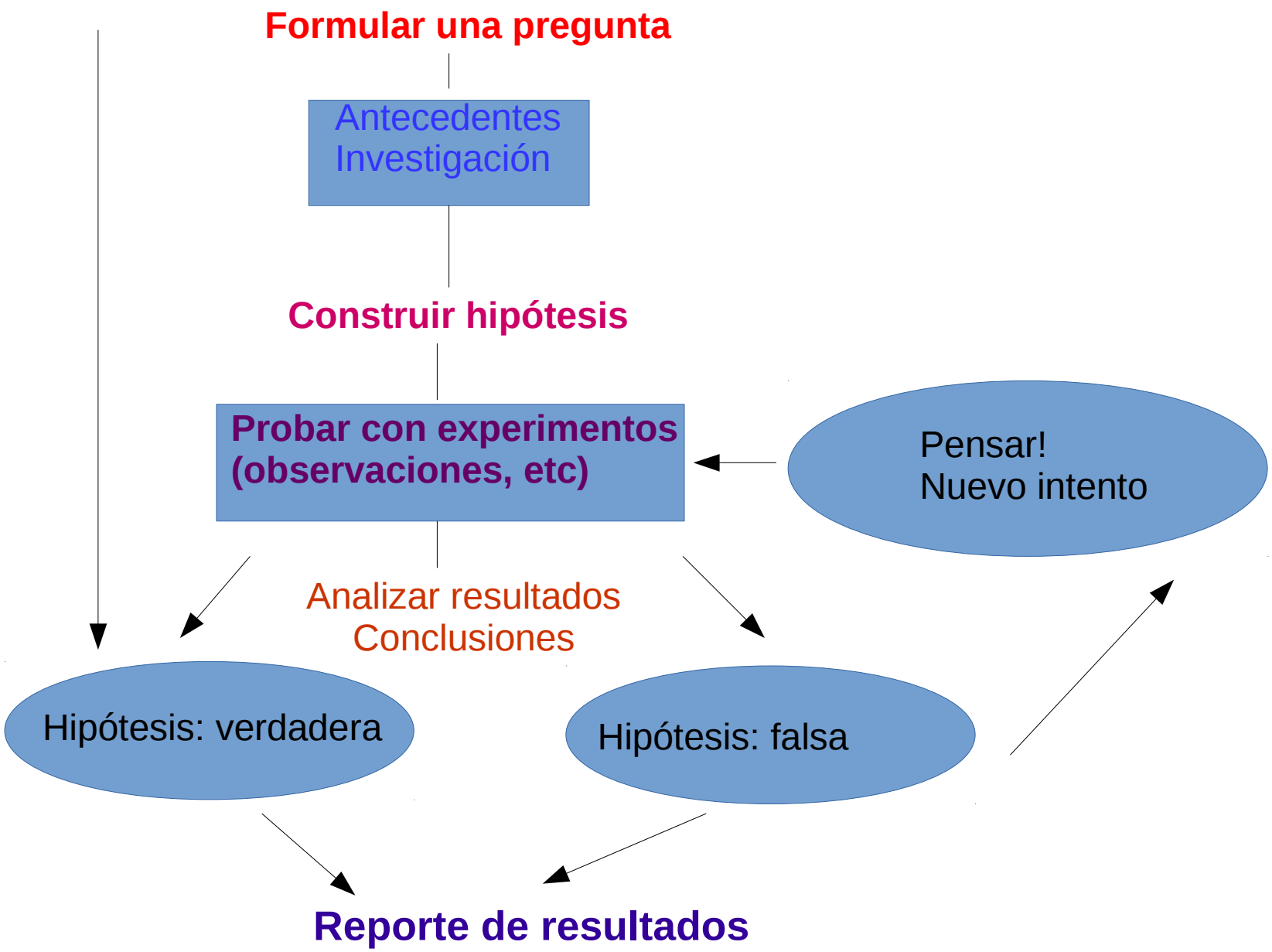
laopinióncoruña.es » **Sociedad**

Sorondo: ´El hallazgo del bosón prueba la existencia de Dios´

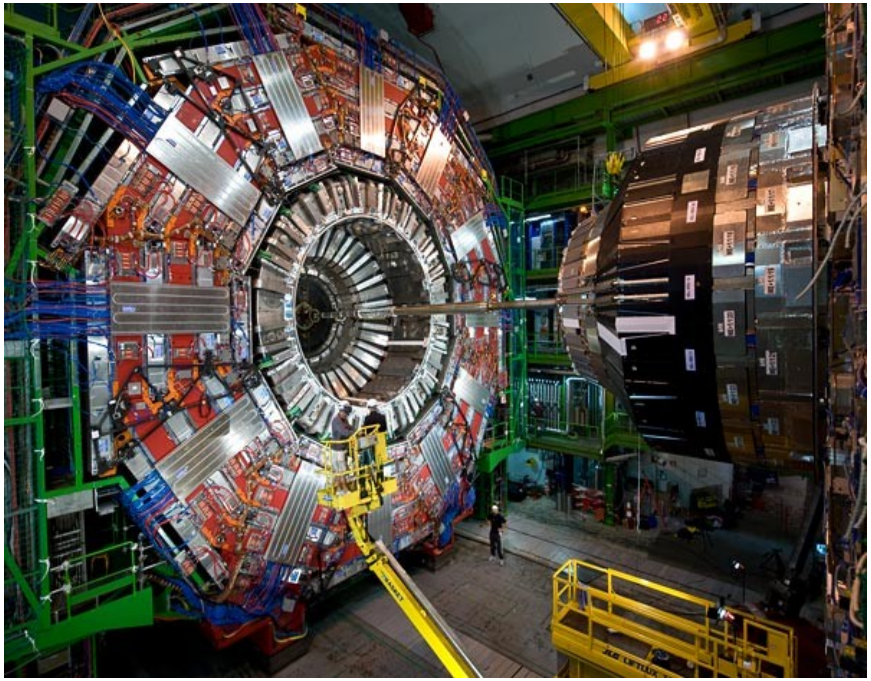
"Si está ahí, es que alguien lo debe haber puesto", sostiene el obispo

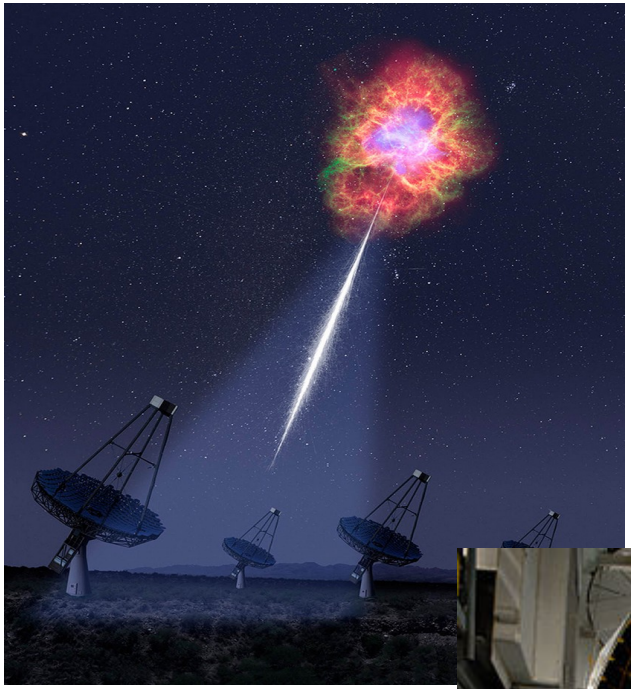
03:25 Tweet Reco

Método Científico

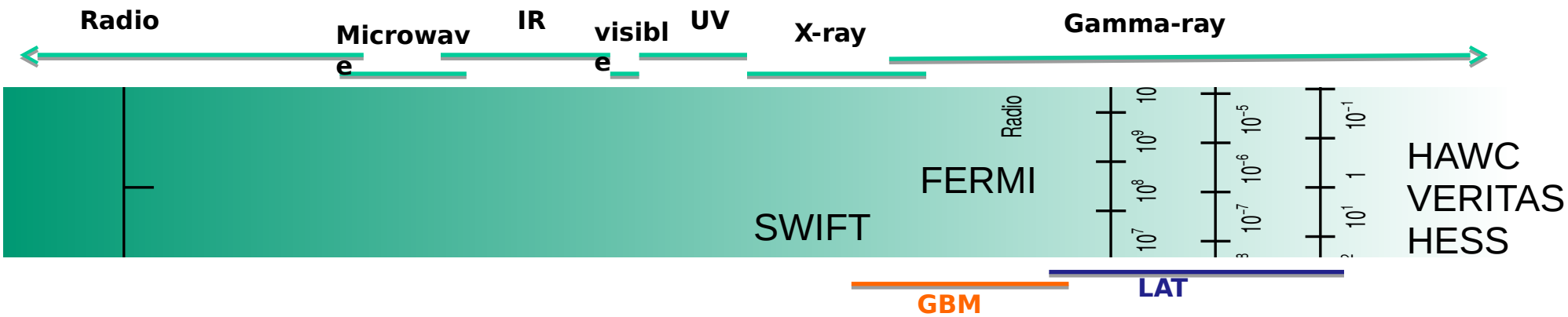


¿Reconocen estos experimientos?





ASTROFISICA GAMMA

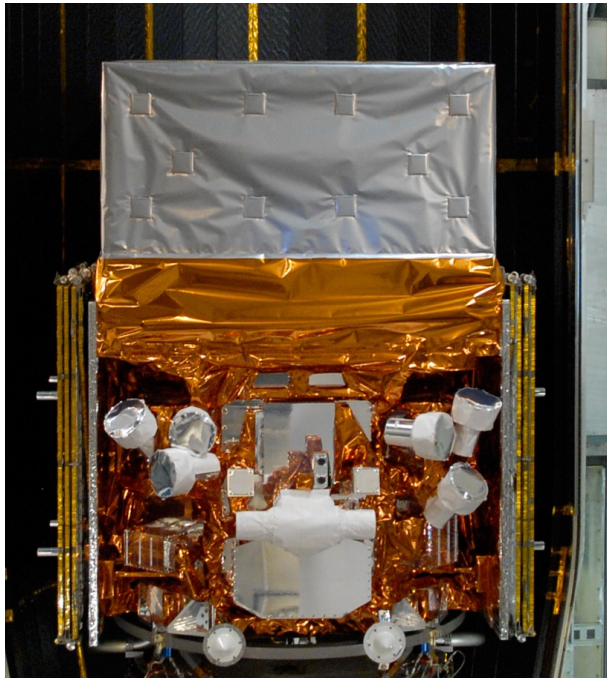


Conexión natural con astrofísica de neutrinos, ondas gravitacionales y rayos cósmicos

Intermediate Gamma rays (aka MeV)

High energy gamma rays (aka GeV)

Very High Energy (VHE) gamma rays (aka TeV)



Large Area Telescope (LAT):

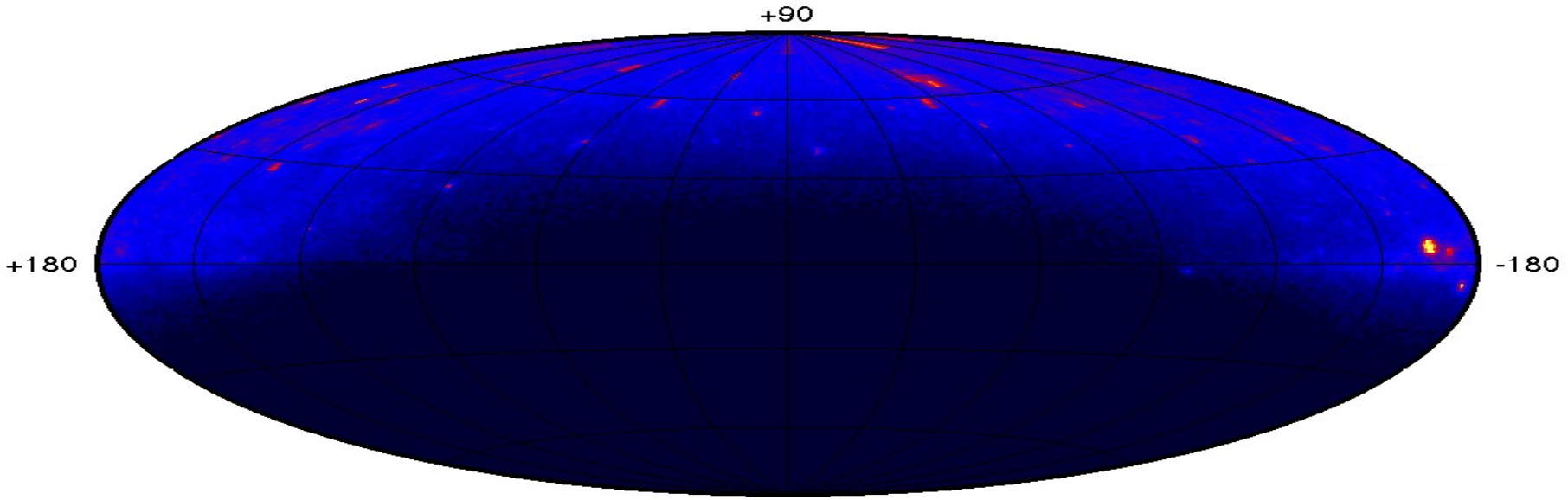
- 20 MeV - >300 GeV
- 2.4 sr FoV (scan all sky ~3hrs)

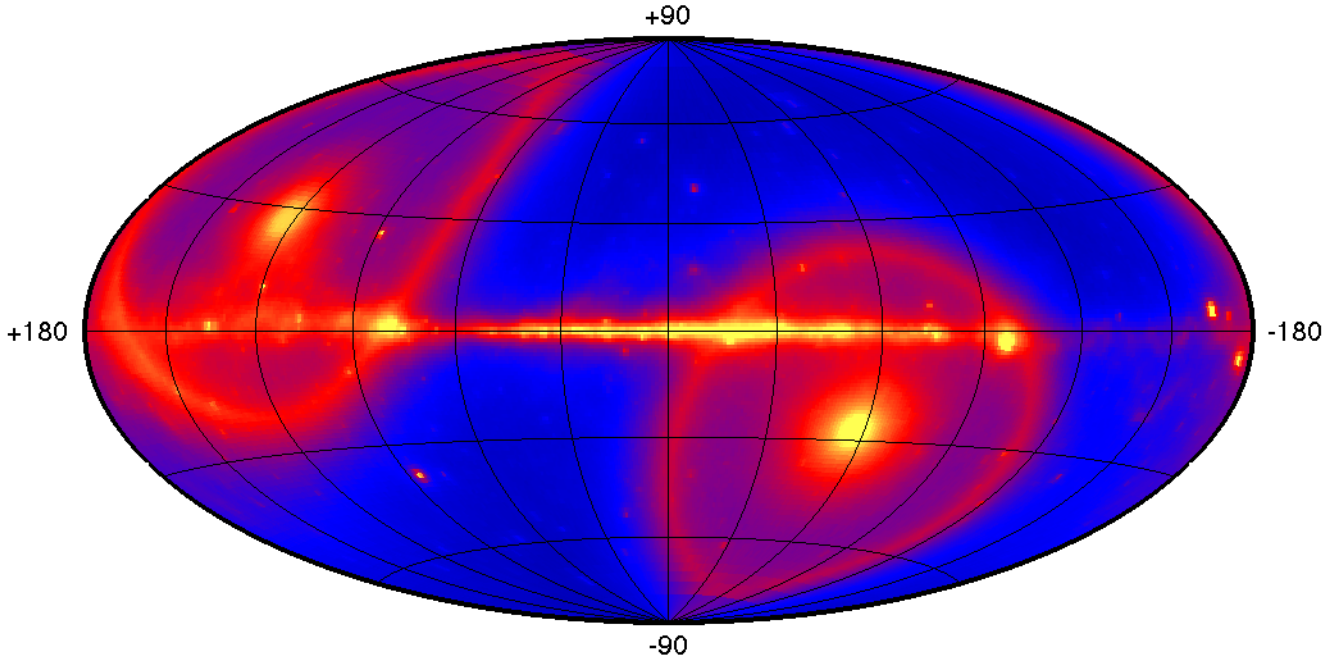
Gamma-ray Burst Monitor (GBM)

- 8 keV - 40 MeV
- Whole sky

OBSERVACIONES

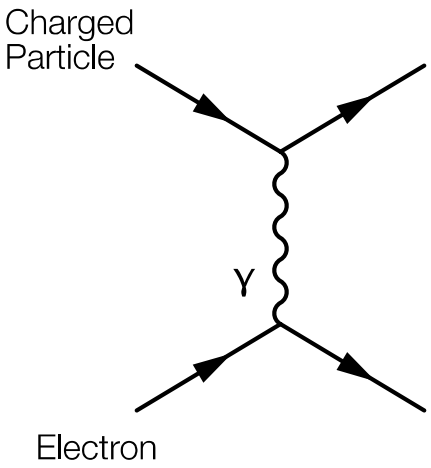
Los rayos gammas no se pueden colimar, integrar en el tiempo y posición.

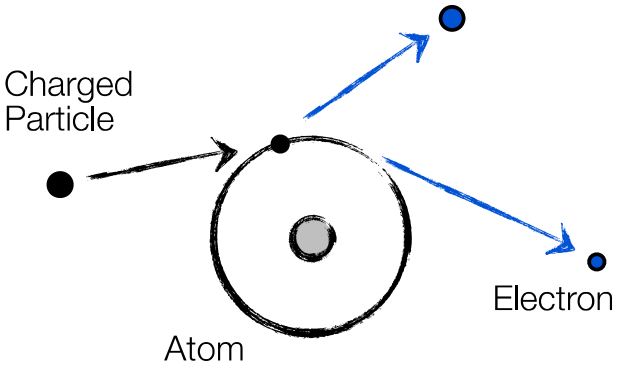




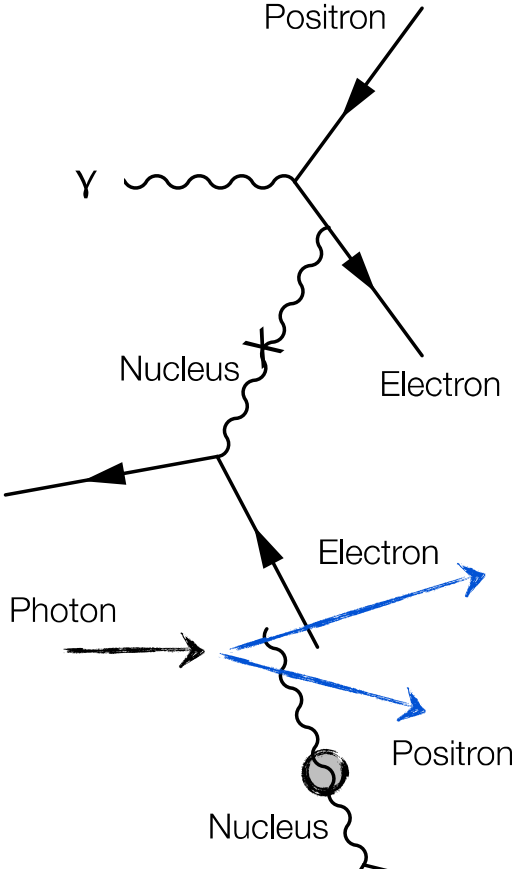
INTERACCIONES

ionización

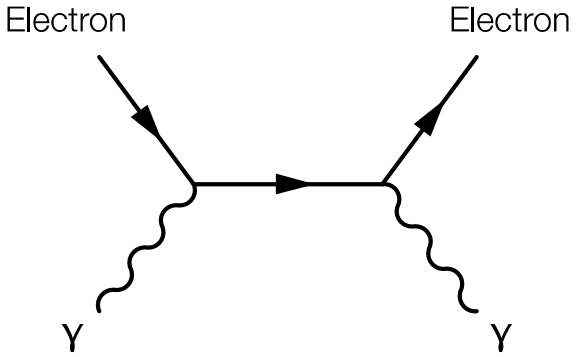


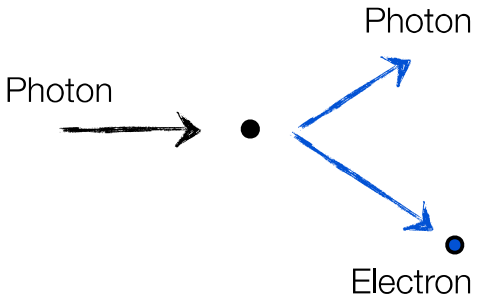


Producción de pares

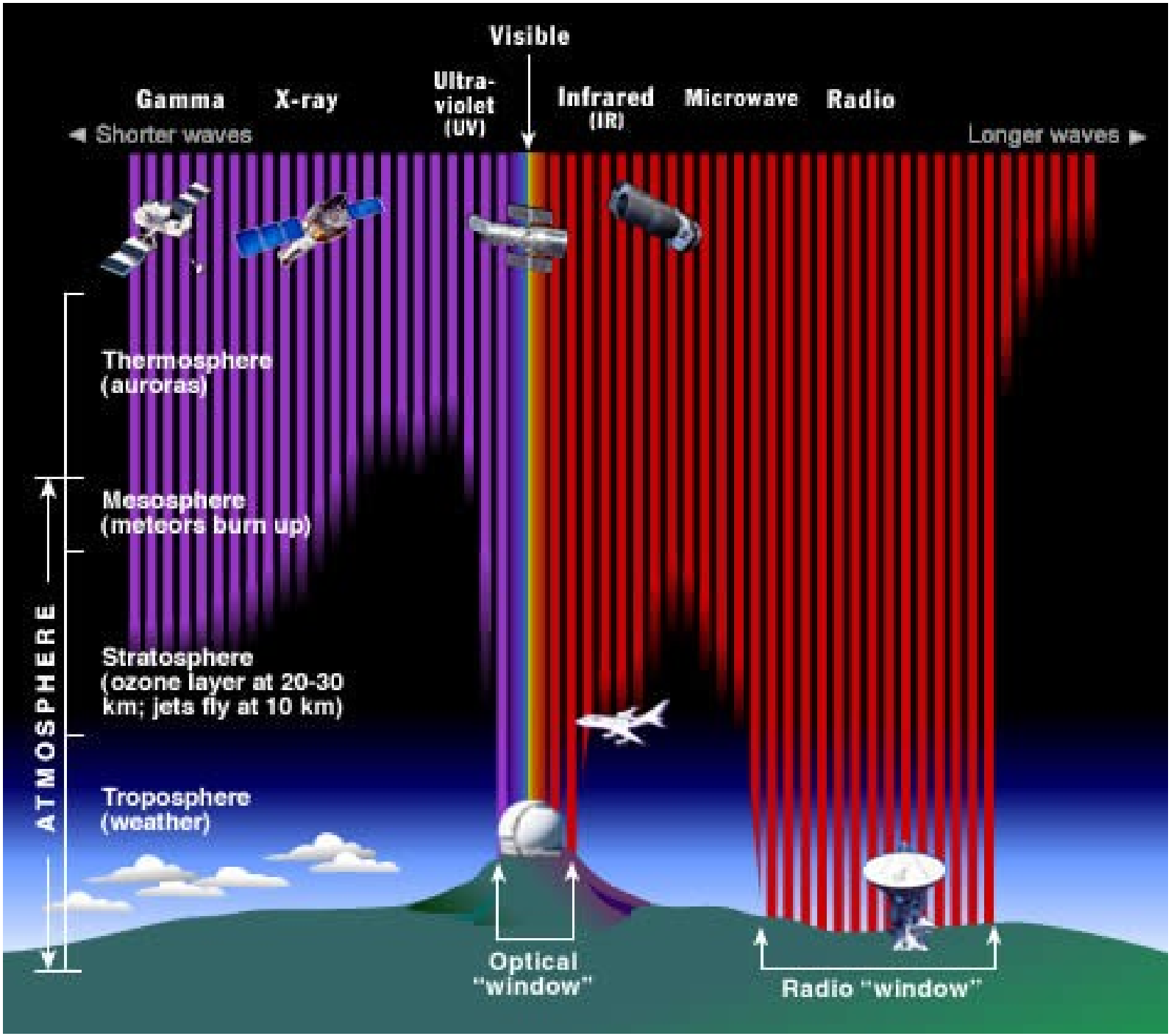


Efecto Compton





Bremsstrahlung

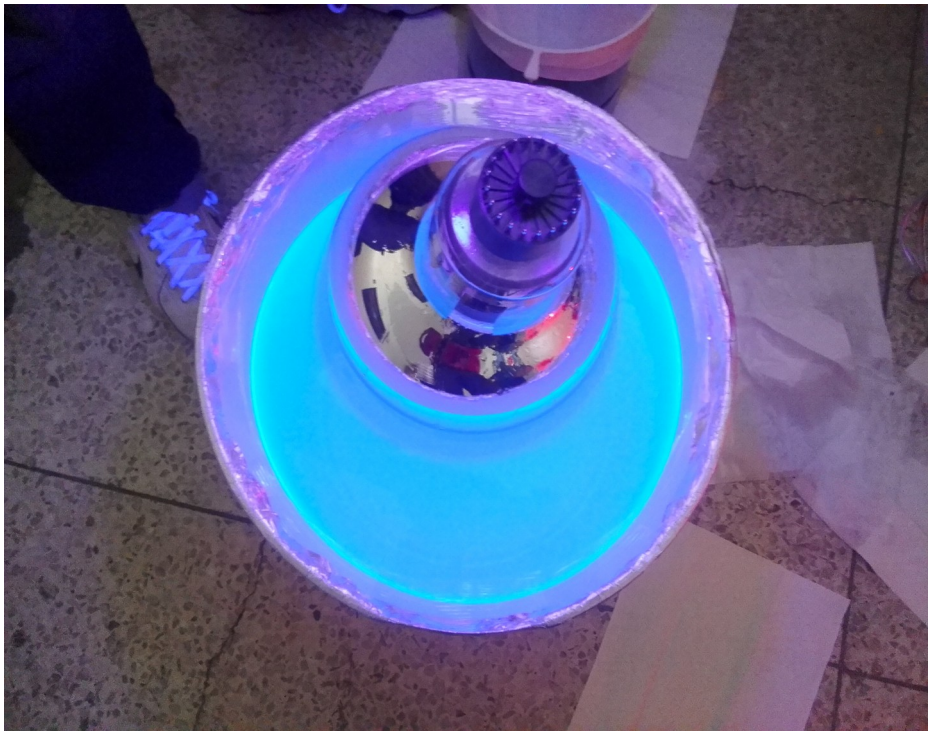

Visible
Gamma
X-ray
Ultra-violet (UV)
Infrared (IR)
Microwave
Radio
Shorter waves
Longer waves
Thermosphere (auroras)
Mesosphere (meteors burn up)
Stratosphere (ozone layer at 20-30 km; jets fly at 10 km)
Troposphere (weather)
ATMOSPHERE
Optical "window"
Radio "window"

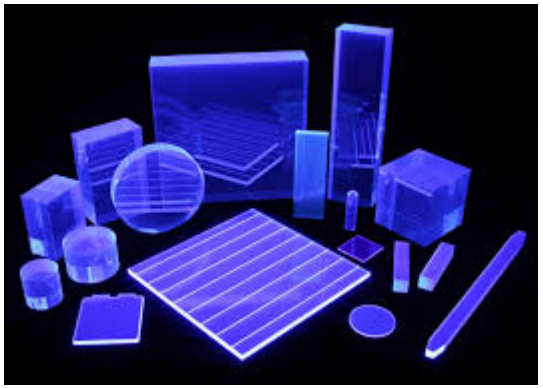
Detectores

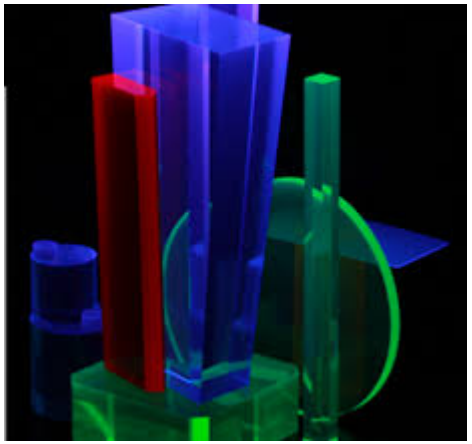
Tubos fotomultiplicadores

Centelladores orgánicos (plásticos, líquidos)

Desplazador de longitud de onda: material fluorescente
convierte longitudes de onda cortas a longitudes de onda largas



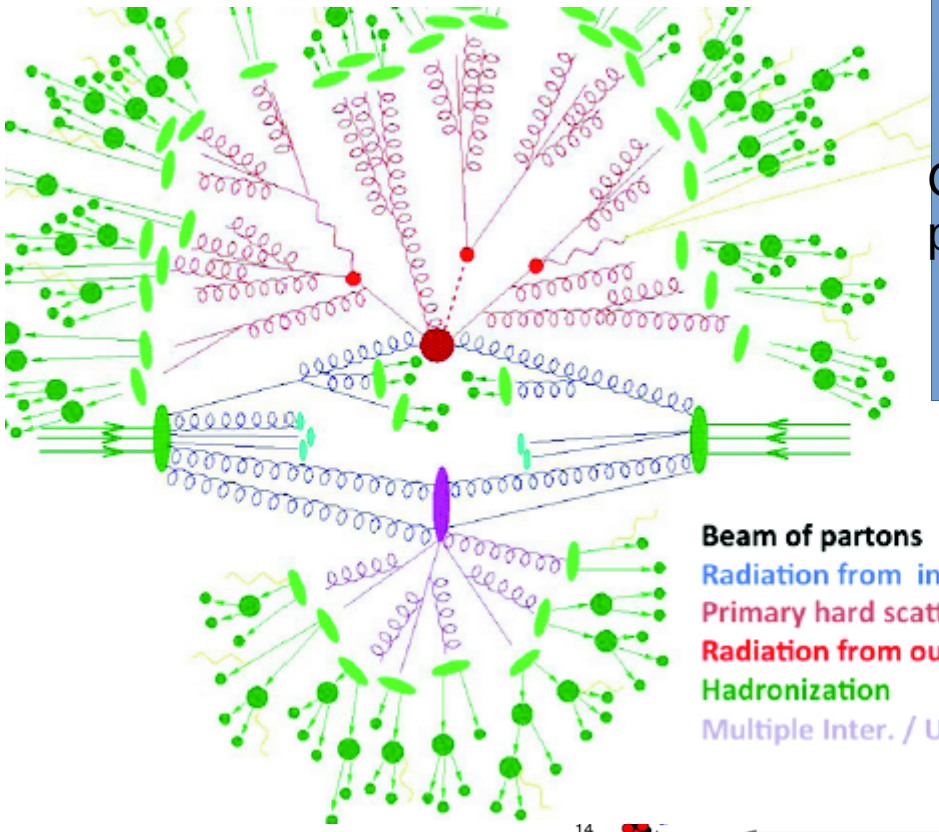




Generación partículas de alta energía

Artificial (cuesta y mucho)

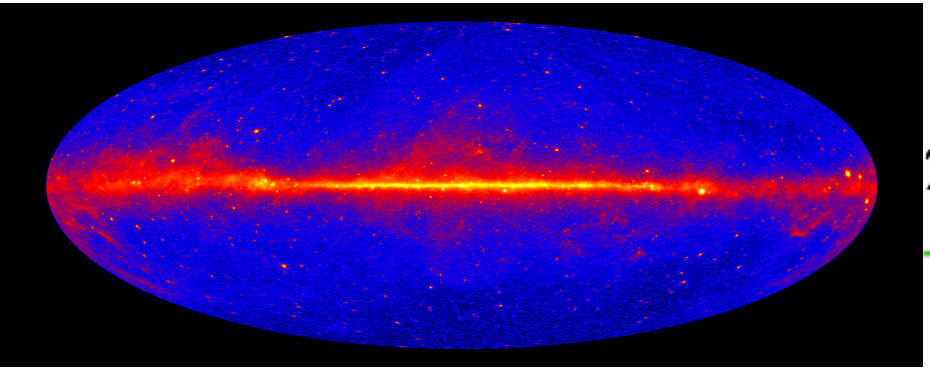
Aceleradores de partículas

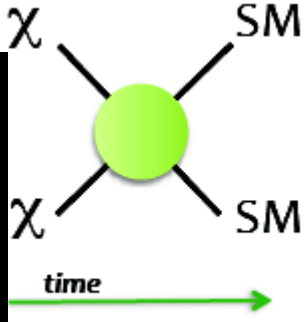


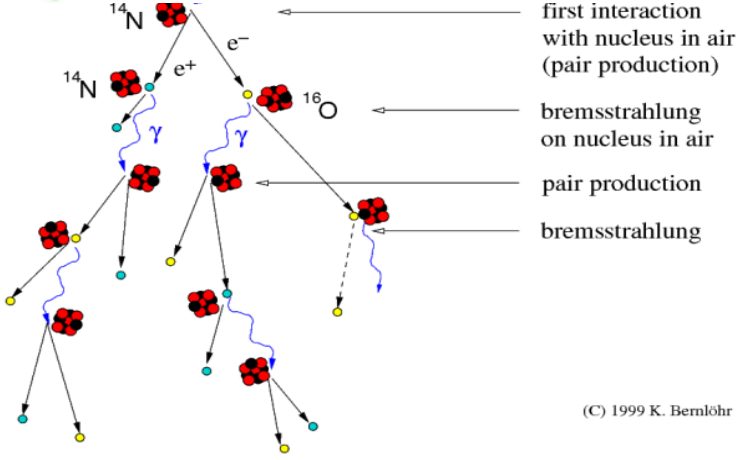
Colisión protón-protón

Naturales (gratis!!!)

Estrellas
Big Bang
Radiactividad
Procesos de aceleración
Cáscadas atmosféricas extensas
Materia oscura

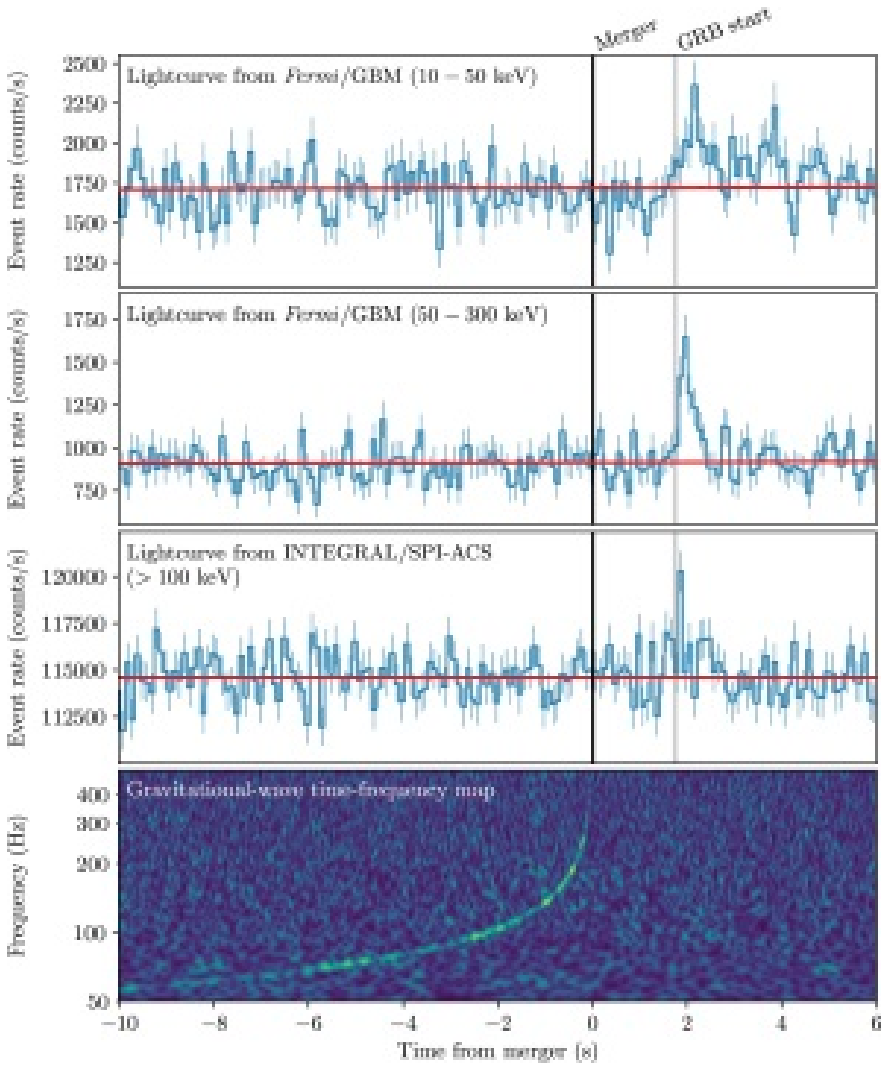


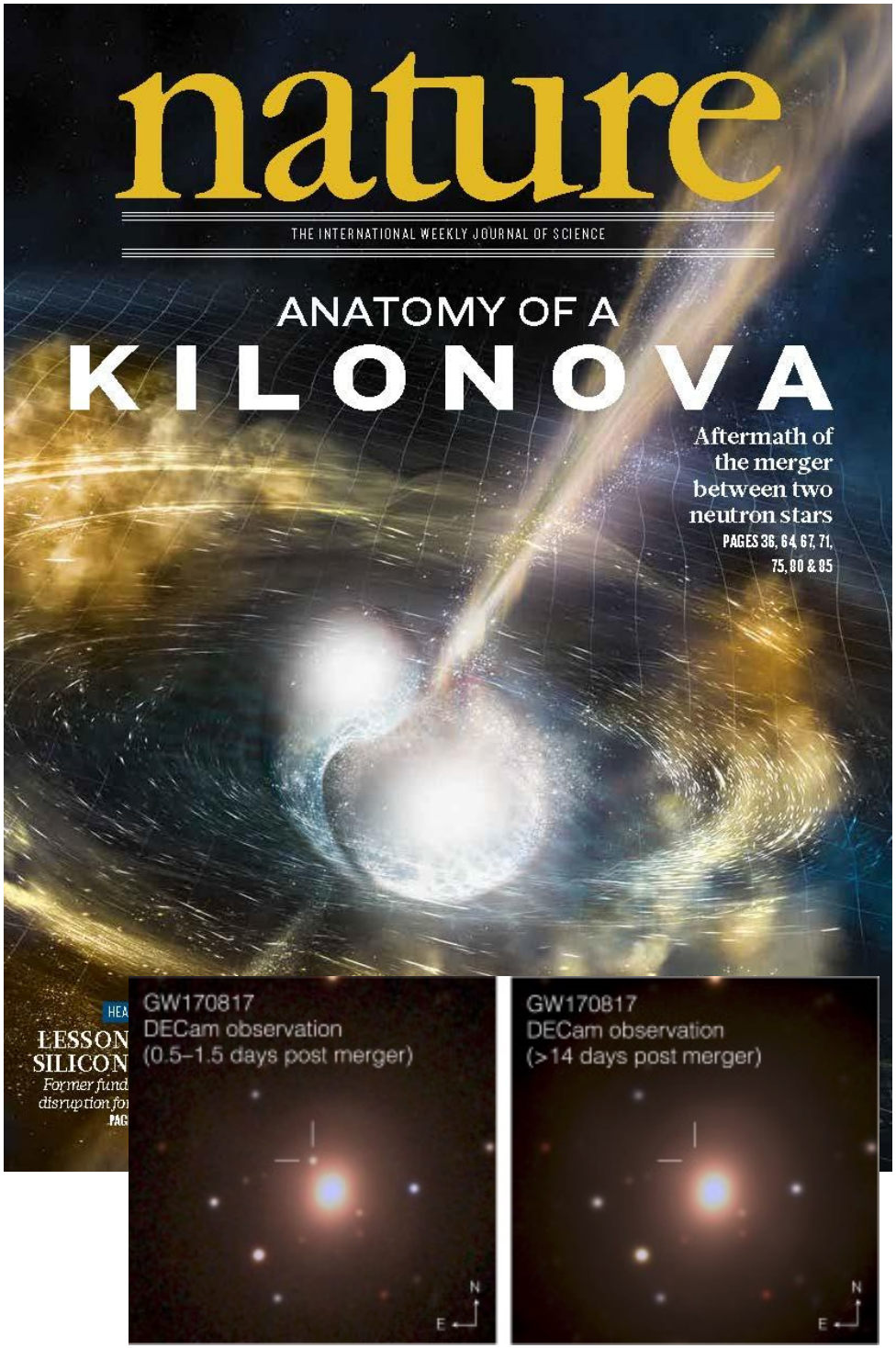




Astronomía multibanda

GRB170817A/GW070817





VENTAJAS DE INSTALAR OBERVATORIOS EN LATINOAMÉRICA

- Andes
Alturas sobre los 4000 m.s.n.m
Atmósfera = 0.5 atmósfera nivel
Del mar
- Sagitario
Observación centro galáctico
dec -26 a -30 grados

País LAGO

Futuro: CTA, Andes, EELT

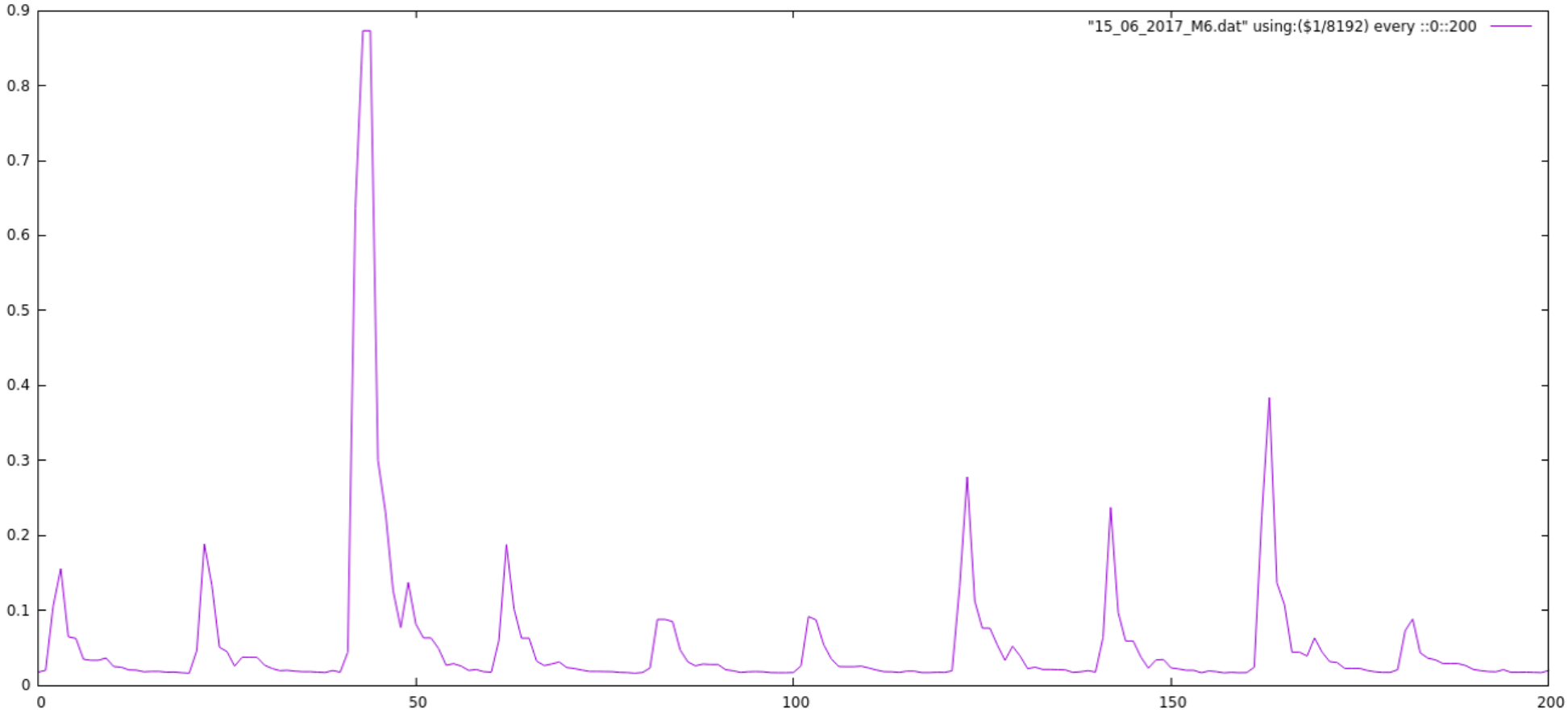
CASO particular
Astropartículas en la EPN

- Proyecto LAGO

Colaboradores
CEDIA
Universidad San Francisco
Escuela Politécnica del Chimborazo
Universidad de Cuenca
Universidad del Azuay

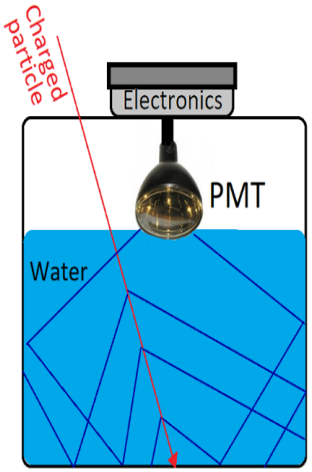
Ventajas
- Los Andes Ecuatorianos son un buen candidato para instalar detectores de Astropartículas, ofrecen una diversidad de altitudes de 0 a 5000 msnm, de fácil y rápido acceso.
- Existe un grupo consolidado

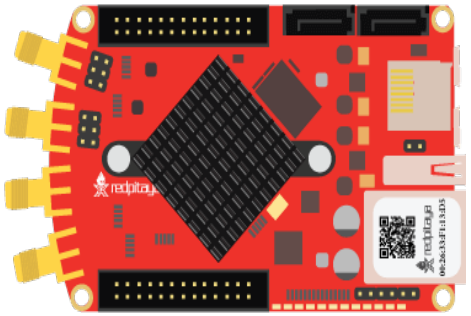
Desafíos

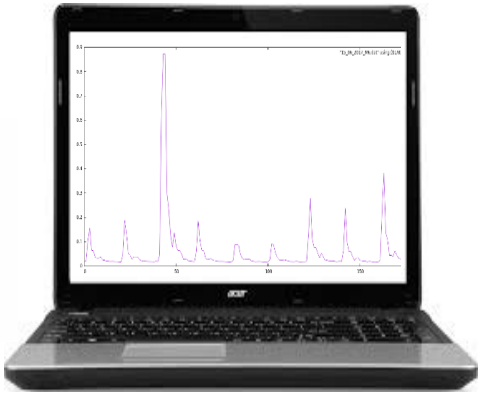


Guardar datos de partículas relativistas:
Muestreo de voltaje de salida del PMT con resolución de 8 nanosegundos.
Problemas de programación y almacenamiento de datos

Software

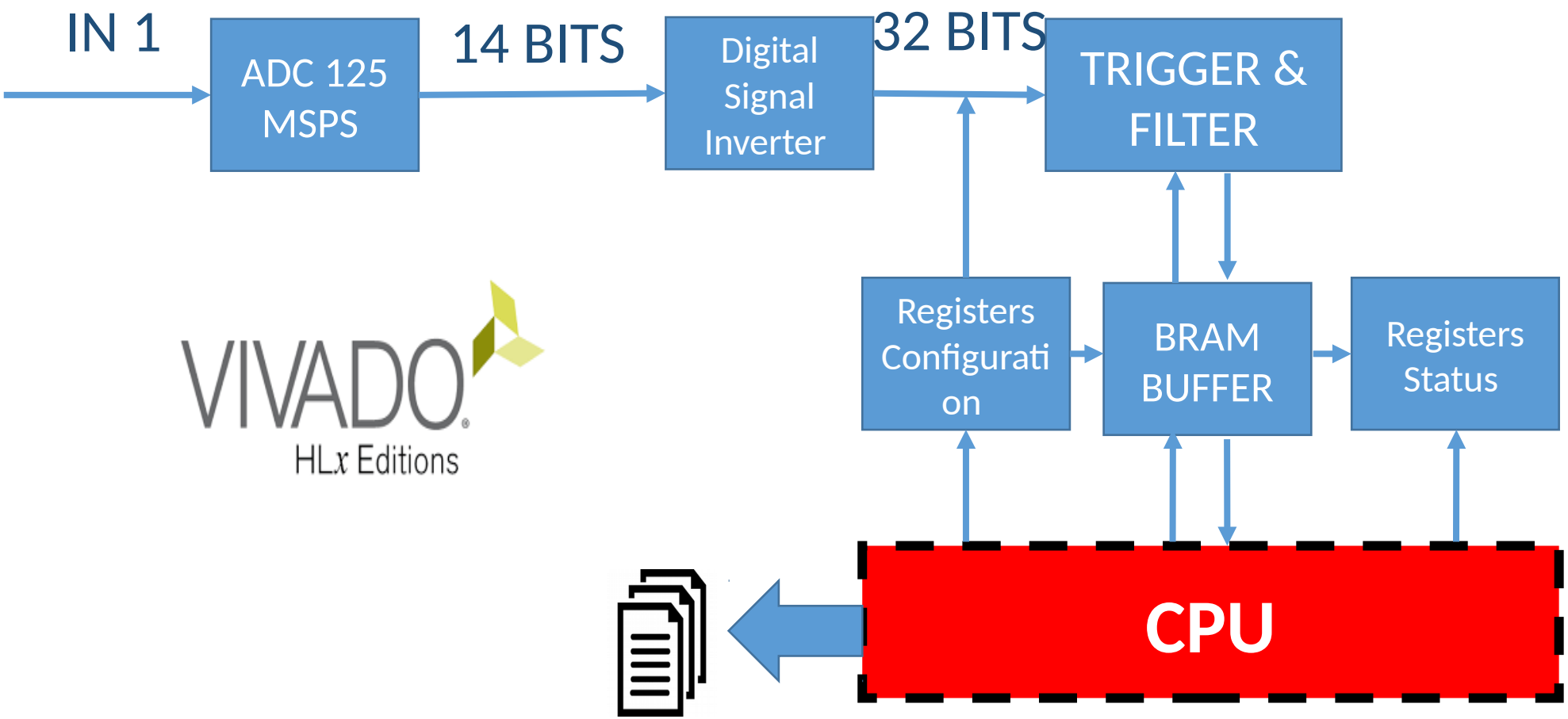






PMT and SENSOR → ACQUISITION → PROCESSING → STORAGE

DATA ACQUISITION



Herramientas gratuitas:

lago.readthedocs.io/en/latest/

Buscar

Watch

Navigation

- Installing Lago
- LagoInitFile
- Specification
- Lago SDK
- Getting started with some Lago Example
- Lago Templates
- Configuration
- Lago build
- Lago CPU Models in detail
- CI Process

Welcome to the Lago project documentation!

Lago Introduction

Lago is an add-hoc virtual framework which helps you build virtualiz ronments on your server or laptop for various use cases.

It currently utilizes 'libvirt' for creating VMs, but we are working on more providers such as 'containers'.

Getting started

- Installing Lago

GITHUB

https://github.com/lago-project/lago

Ad-hoc virtual testing environment framework http://lago.readthedocs.org

virtualization | testing-framework | python

1,163 commits | **20** branches | **40** releases

Branch: **master** | New pull request | Find file | Clone or download

ovirt-infra Merge pull request #676 from mykaul/still_got_100 ... Latest commit 89599c3 6 hours ago

automation	automation: install with pip package-by-package	3 months ago
docs	docs: Adding el7.4-base	a month ago
etc	Remove ovirtlago	7 months ago
lago	Switch the log of SSH retries to display	6 days ago

Linux

Kahoot!

Game PIN

Enter

Red CLARA

+ Red + Ciencia

IMPORTANTE!
Capacitaciones!! Juntar investigadores para fortalecer alianzas y colaboraciones existentes.

VII SCHOOL ON COSMIC
RAYS AND ASTROPHYSICS

Acknowledgements

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LAGO

PARTICULAS - ASTROPARTICULAS - RADIACIONES
LEOPARD
UNIVERSIDAD SAN FRANCISCO DE QUITO

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