

Developing Water Cherenkov Detectors in Quito - Ecuador



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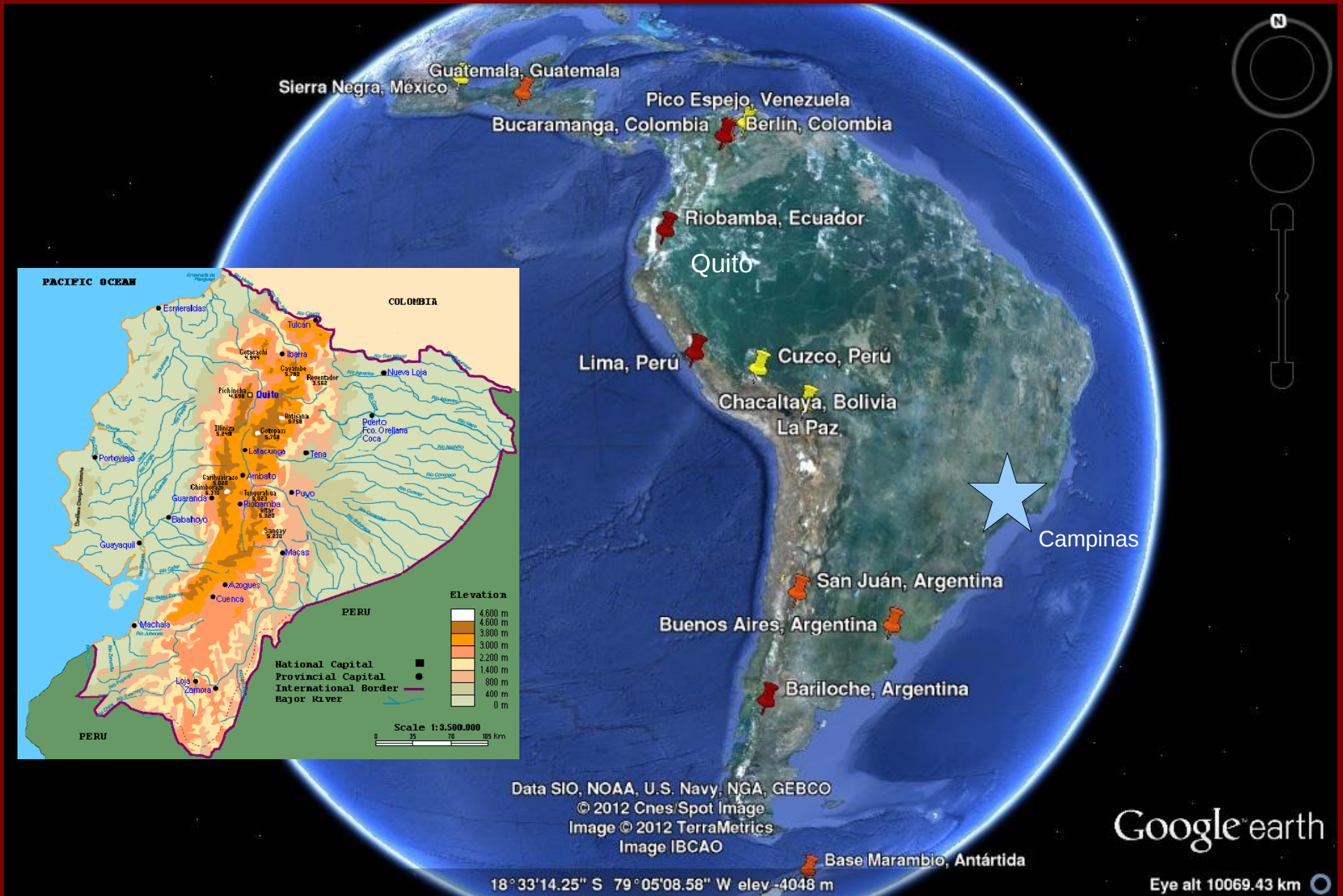


Astronomy in Ecuador

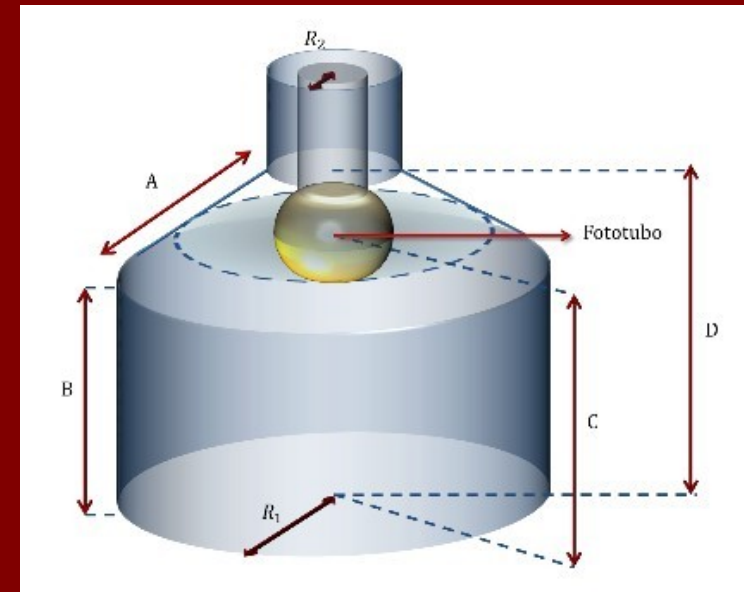
- Escuela Politécnica Nacional
- Observatorio Astronómico de Quito
- Universidad San Francisco de Quito



LAGO sites



LAGO project
Latin American Giant Observatory
<http://lagoproject.org/>



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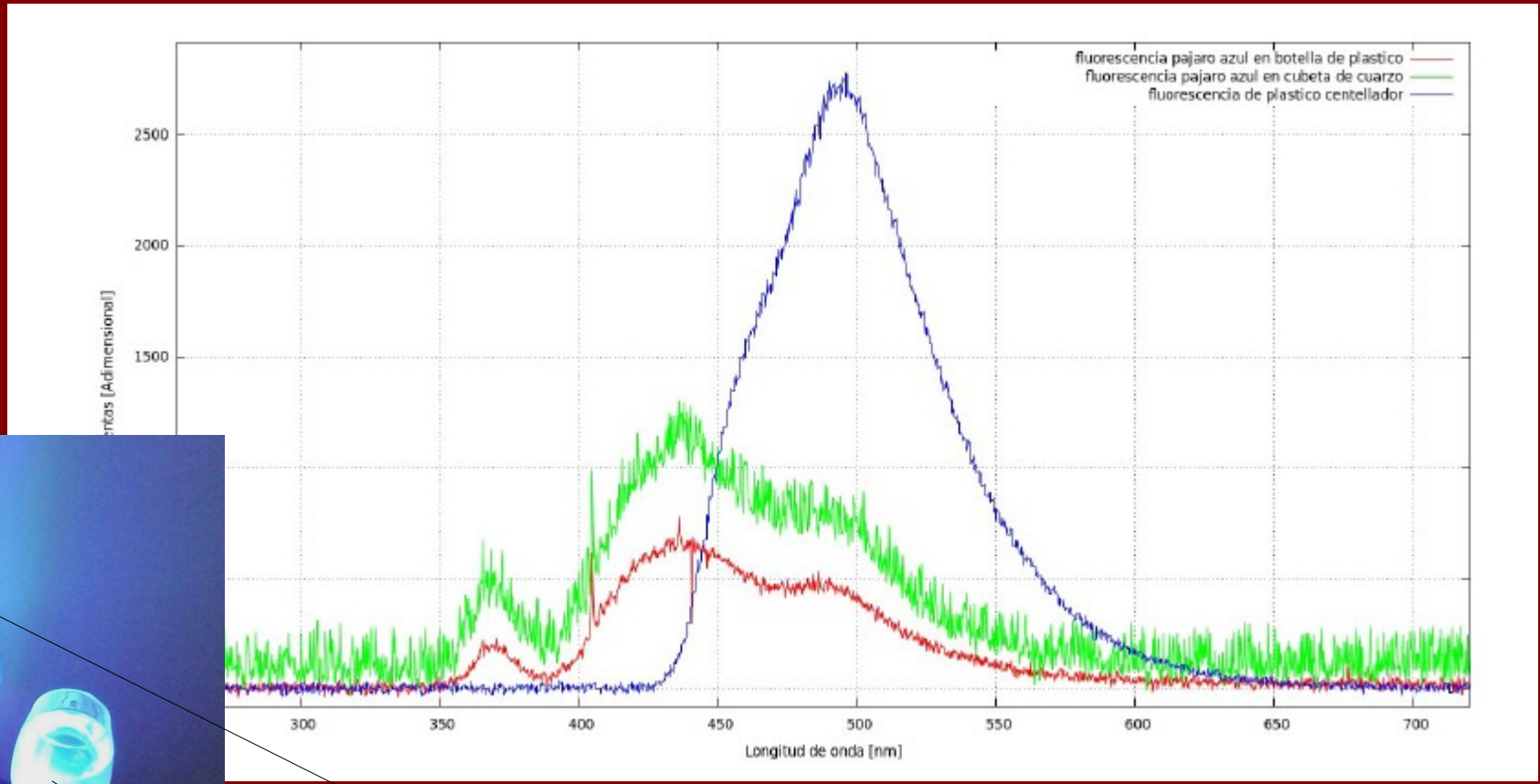


Building a WCD 2014

Fermi school 2016

Alternative radiator medium

Fluorescence spectra of treated water



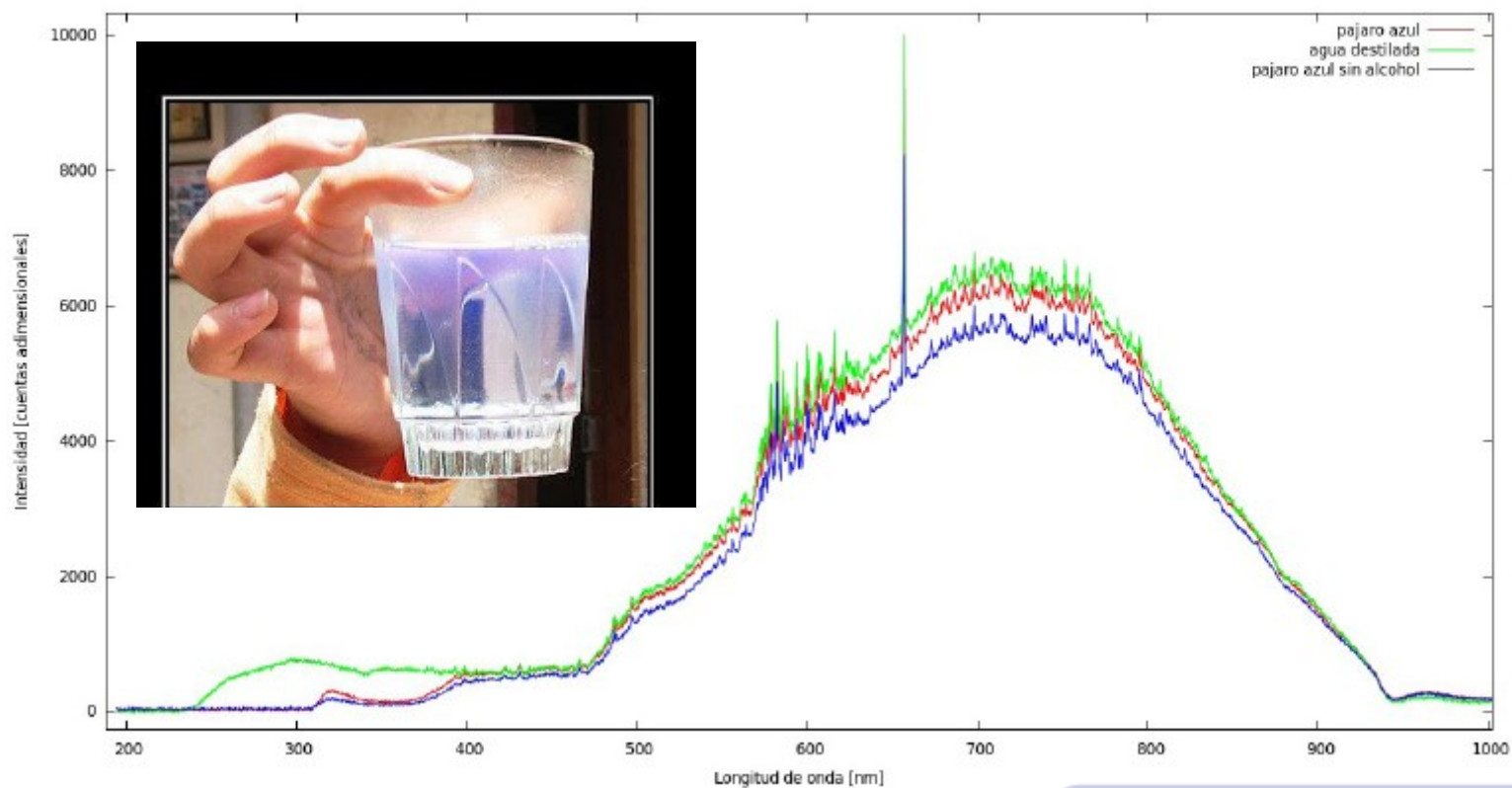
Tequila

Pajaro Azul

Plastic scintillator

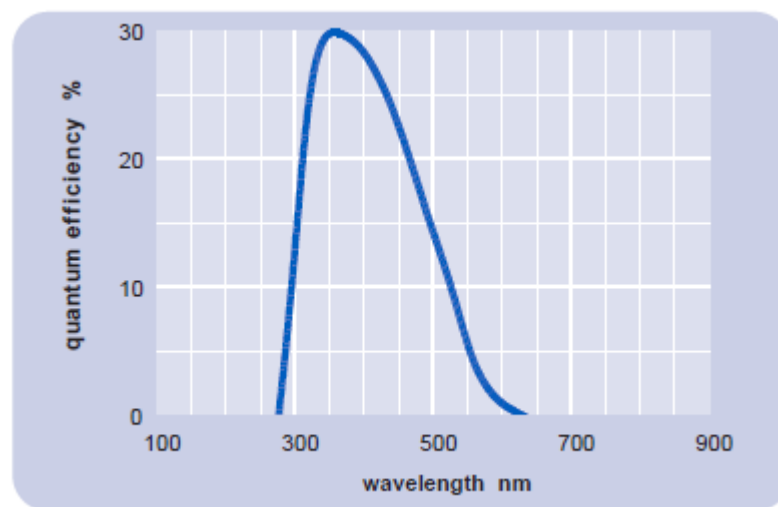
Pajaro azul is a traditional Beverage made in central Andes of Ecuador
3 USD/ liter

Absorption spectra

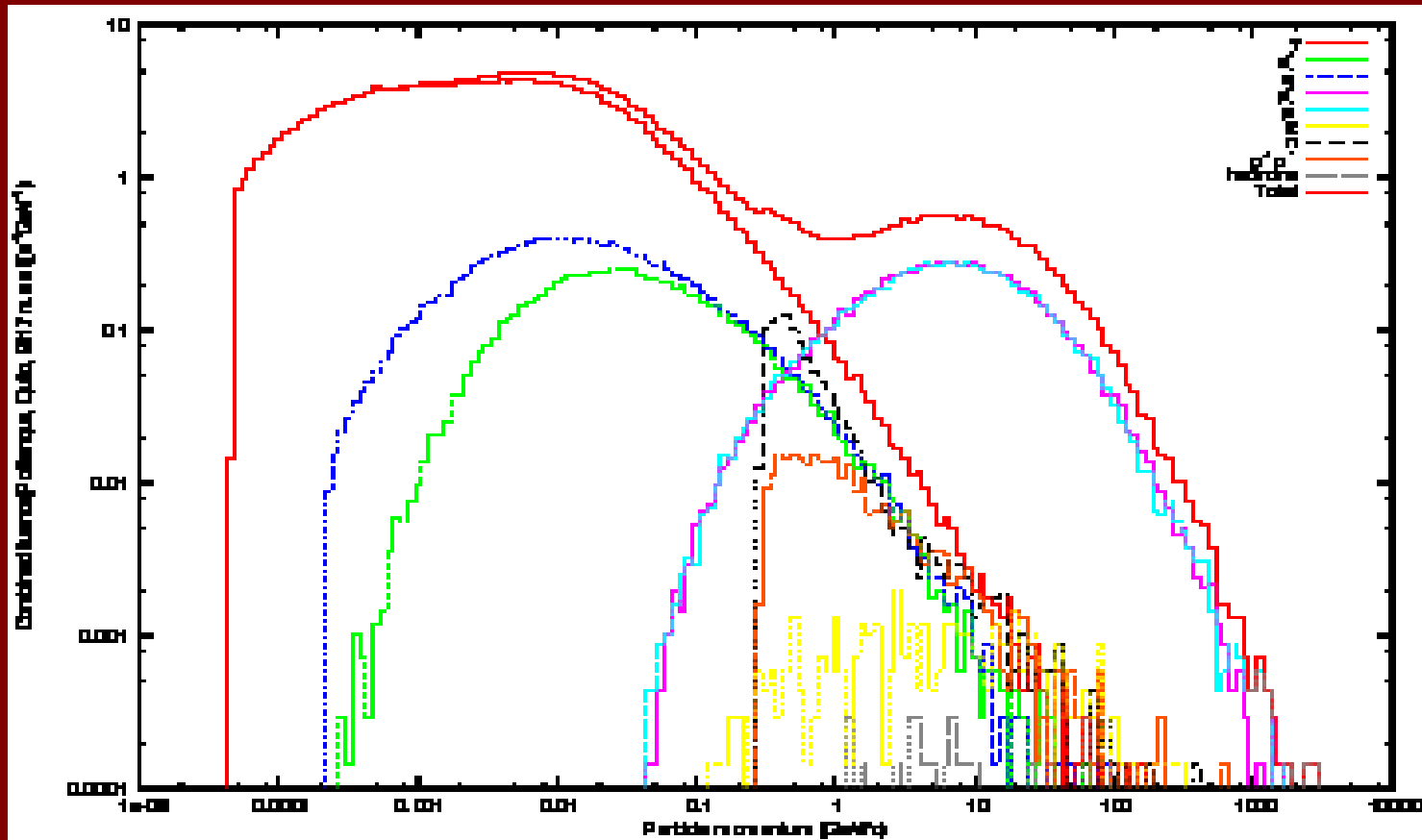


200 mm (8") photomultiplier

Pajaro Azul matches our PMT detection range

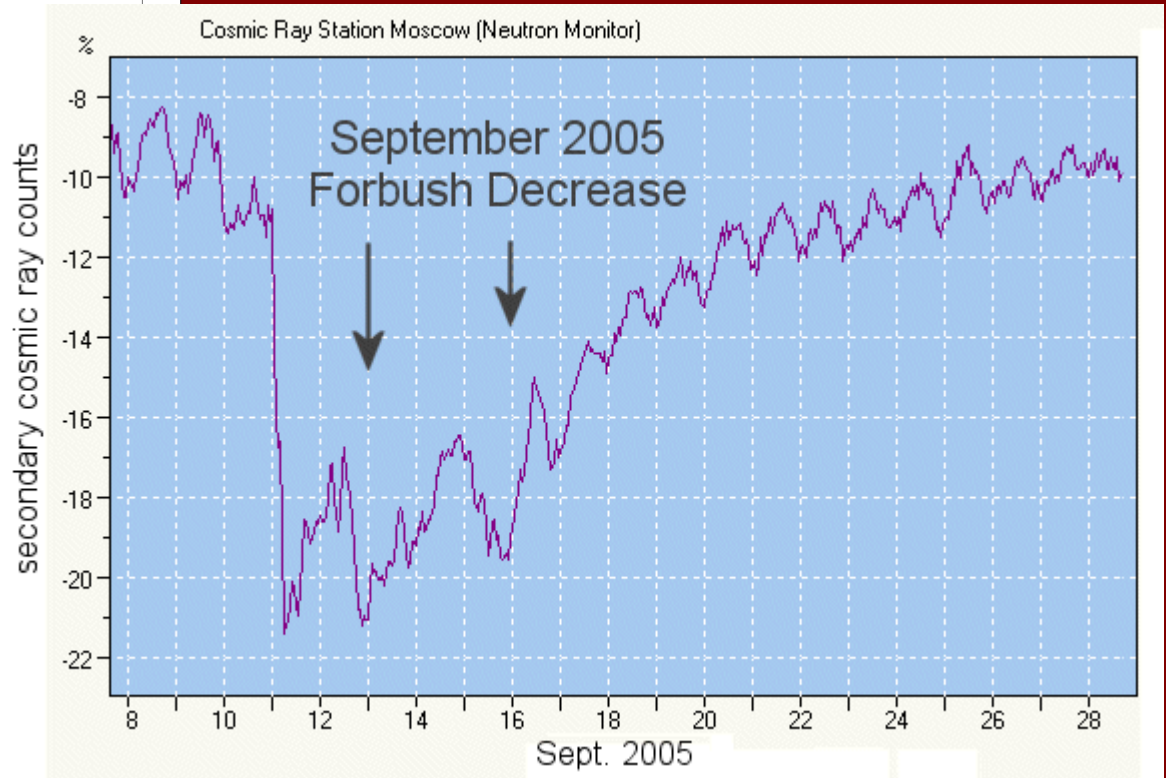
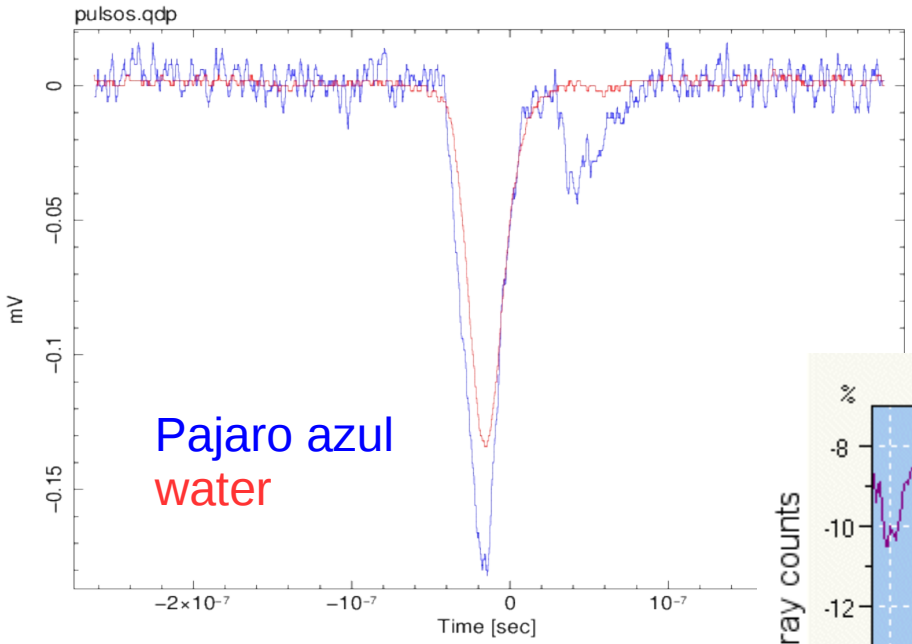


Detection and simulations



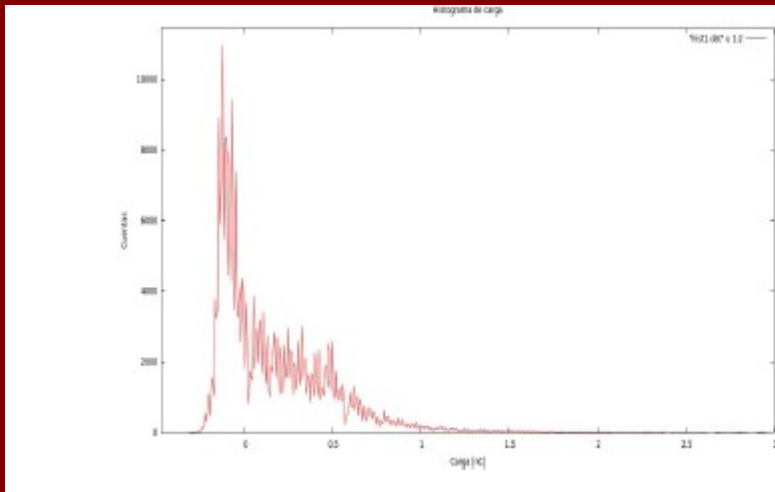
Simulated secondary flux in Quito 2817 m.a.s.l.

Solar physics

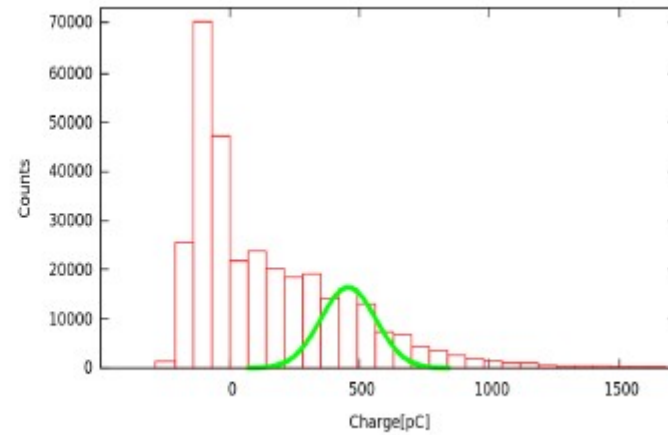


Bariloche detector (Asorey & Dasso)

Some measurements



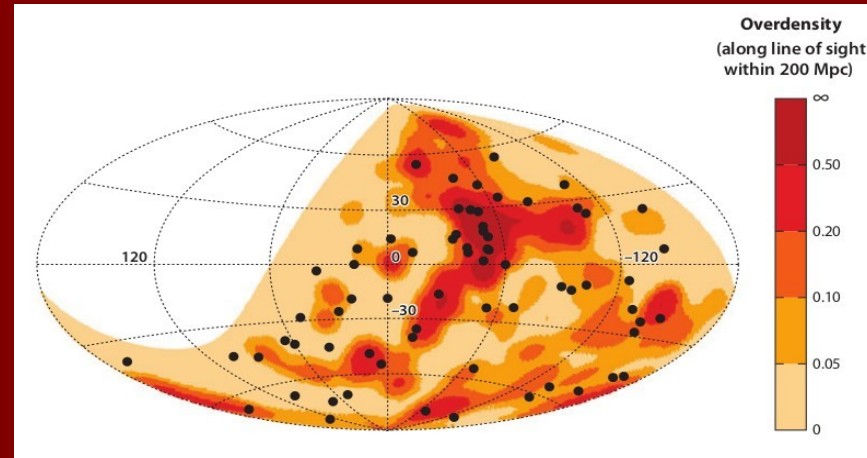
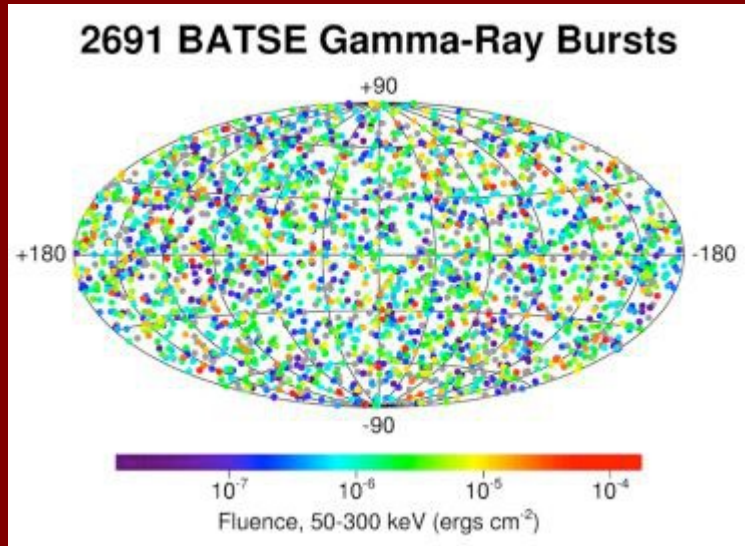
Charge histogram



VEM



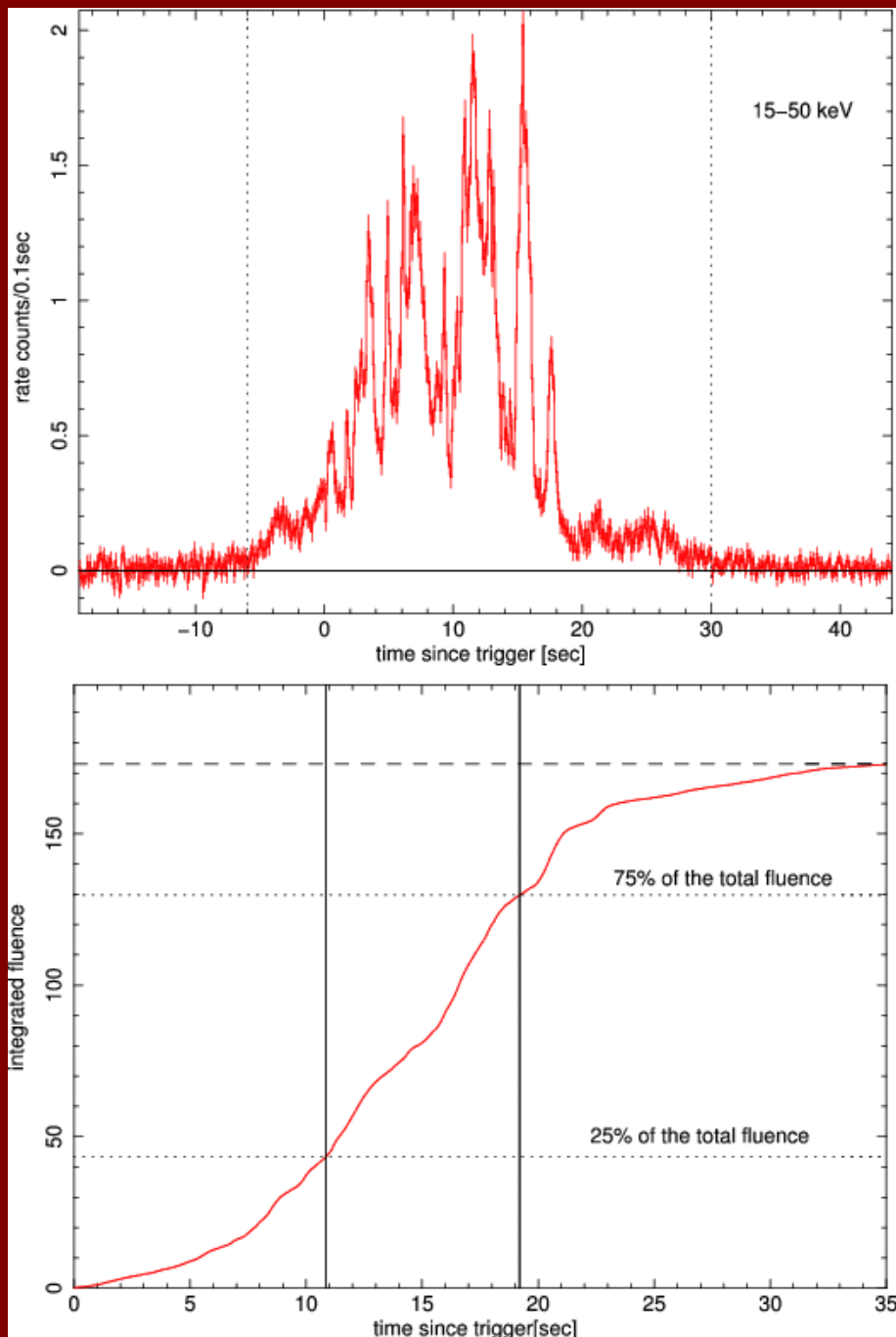
Gamma Ray Bursts (GRBs)



Abreu et al (2010)

Still is not clear the progenitors of GRBs
Is really a barionic matter correlation with GRBs?

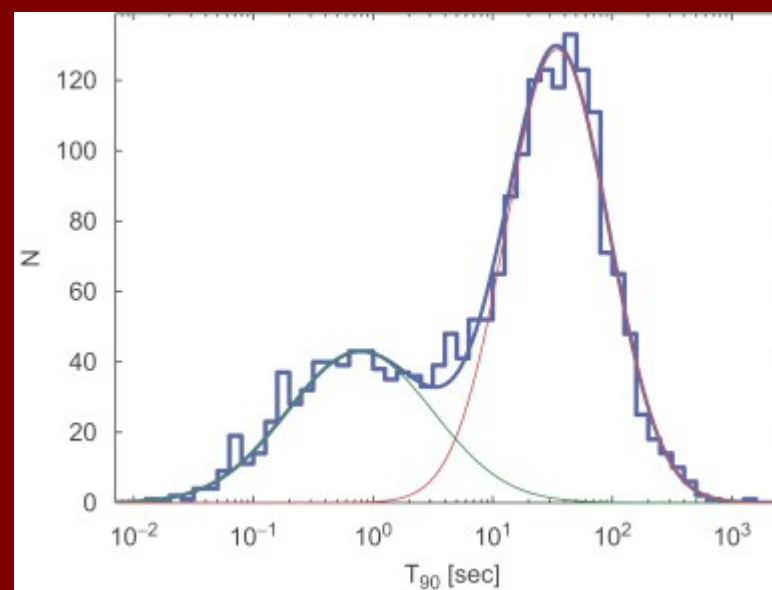
Canonical classification of GRBs



Kouveliotou 1993

Cumulative flux

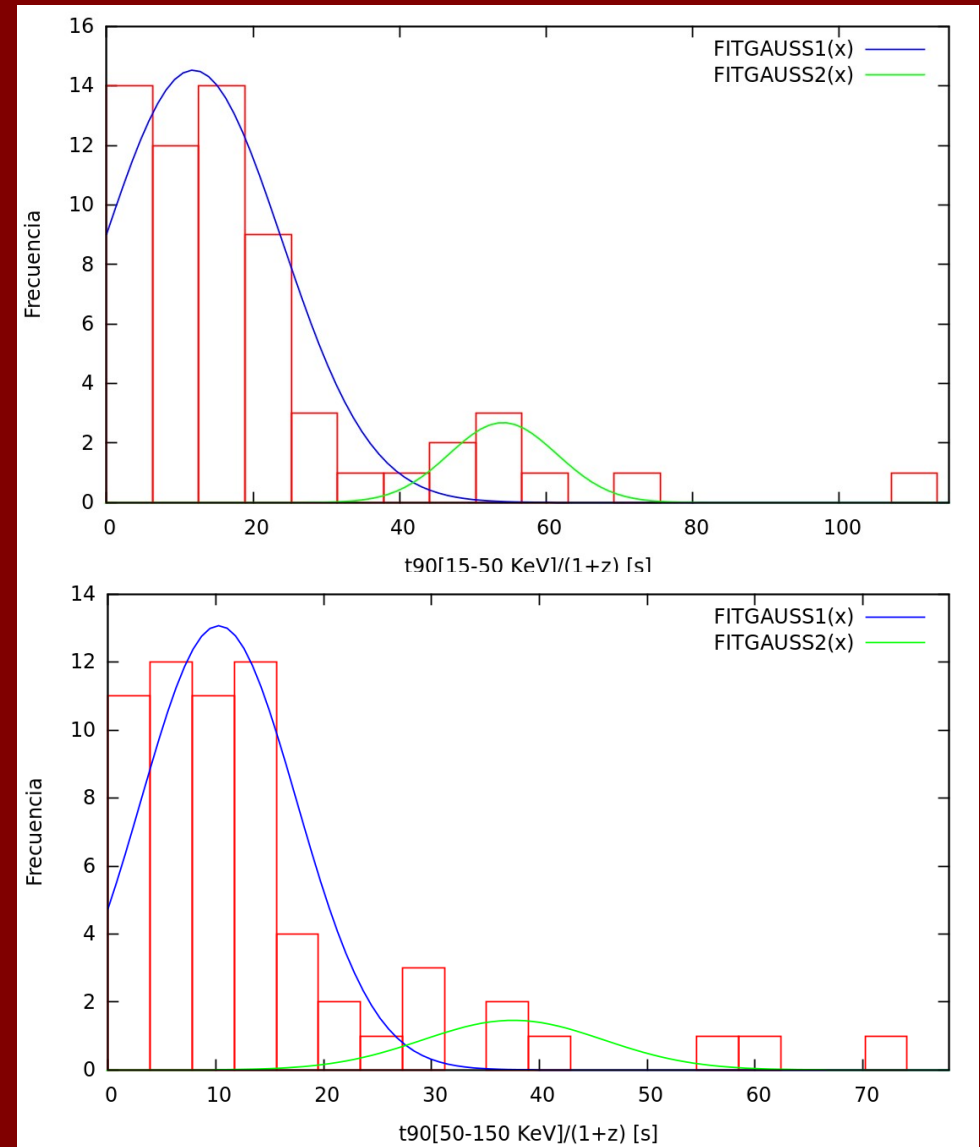
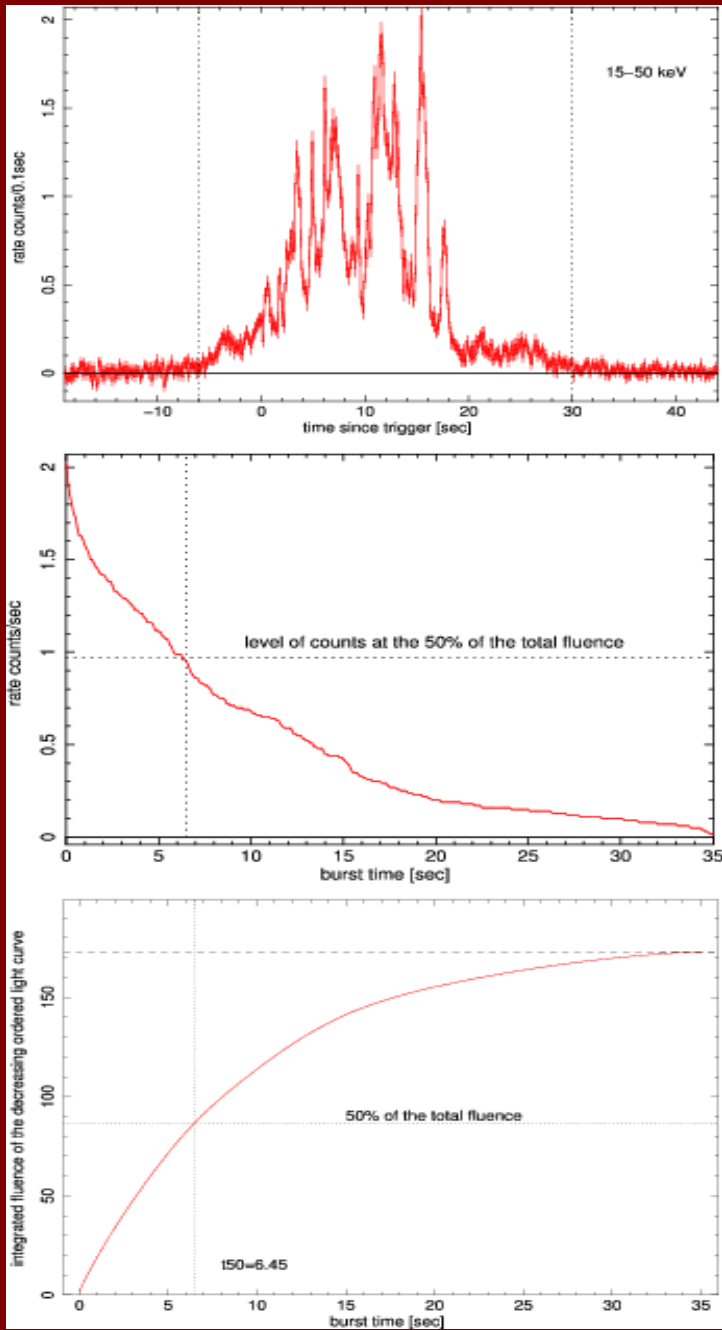
Long GRBs $T_{90} > 2$ sec
Shorts GRBs $T_{90} < 2$ sec



Horvath 2004

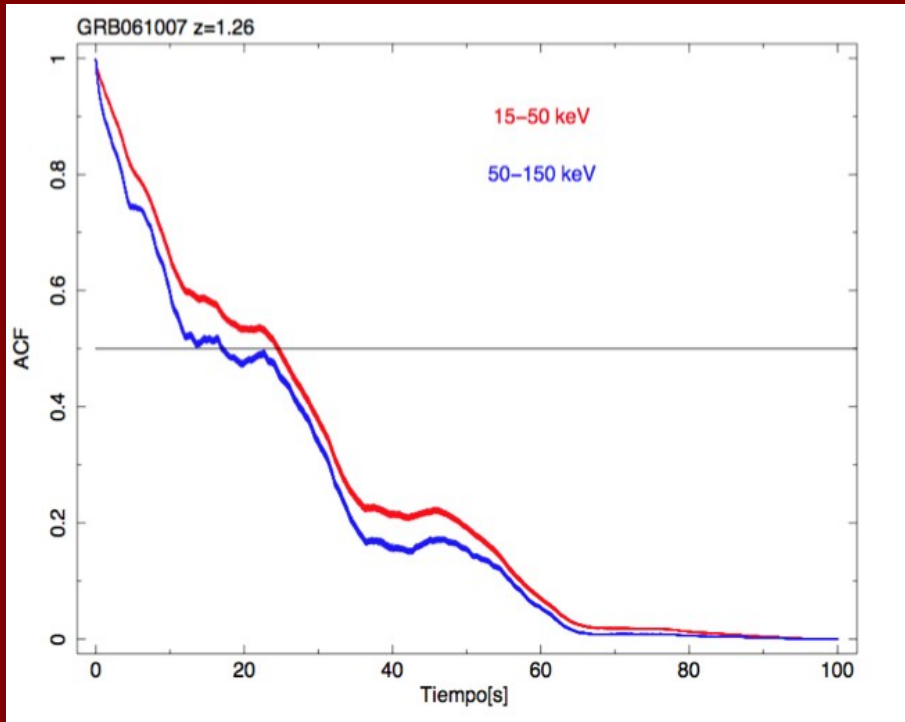
Emission time of GRBs

Andrade 2014



Distribution on emission time for 62 Swift bursts

Autocorrelation function

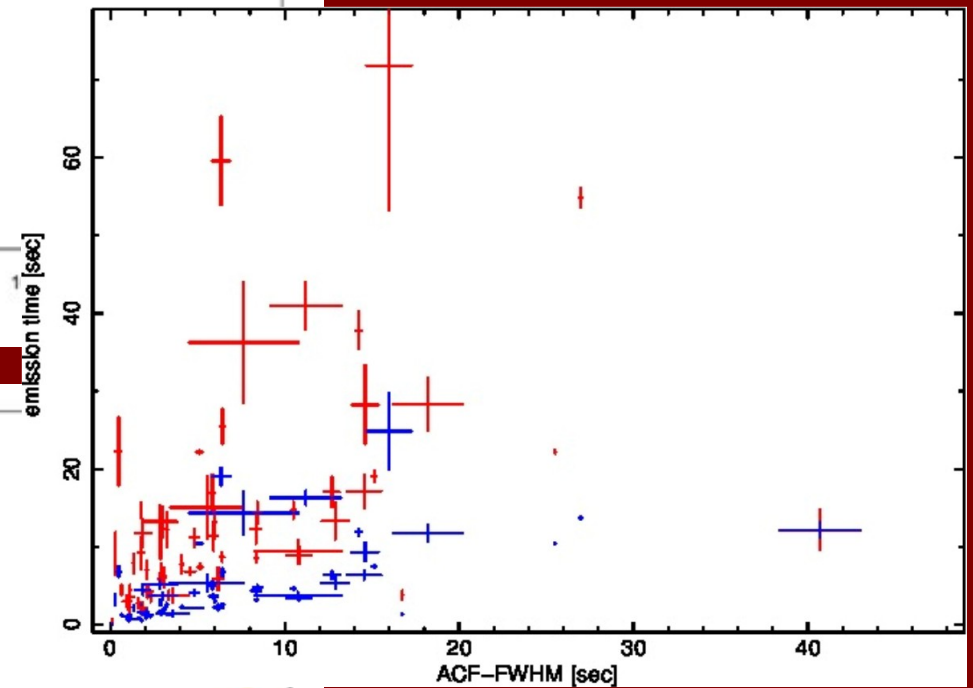
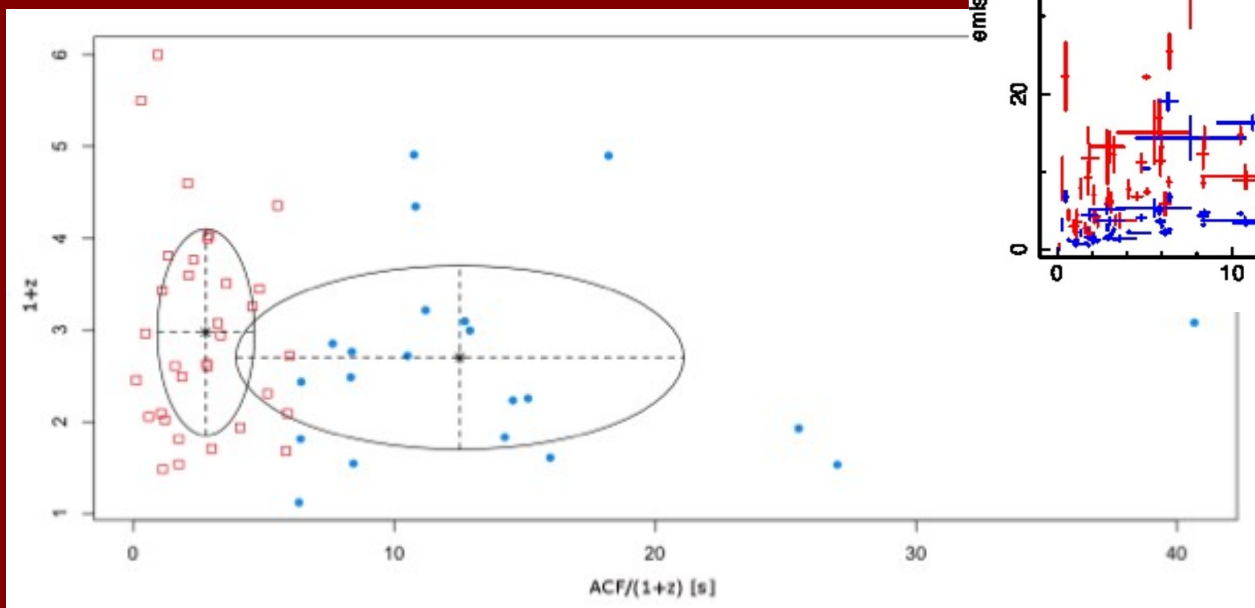
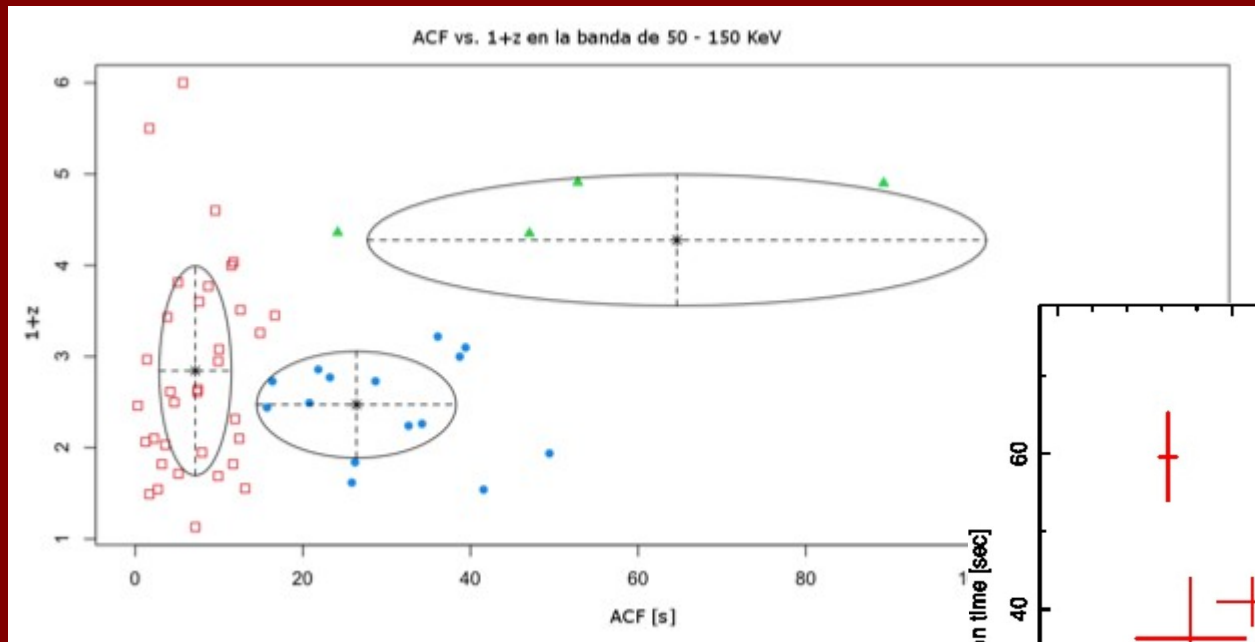


$$A(\tau) = \sum_{i=0}^{N-1} \frac{C_i C_{i+k}}{A_0}, \quad k = 1, \dots, N-1$$

Bimodal distribution in 16
long GRBs detected by
Beppo SAX
Borgonovo 2007

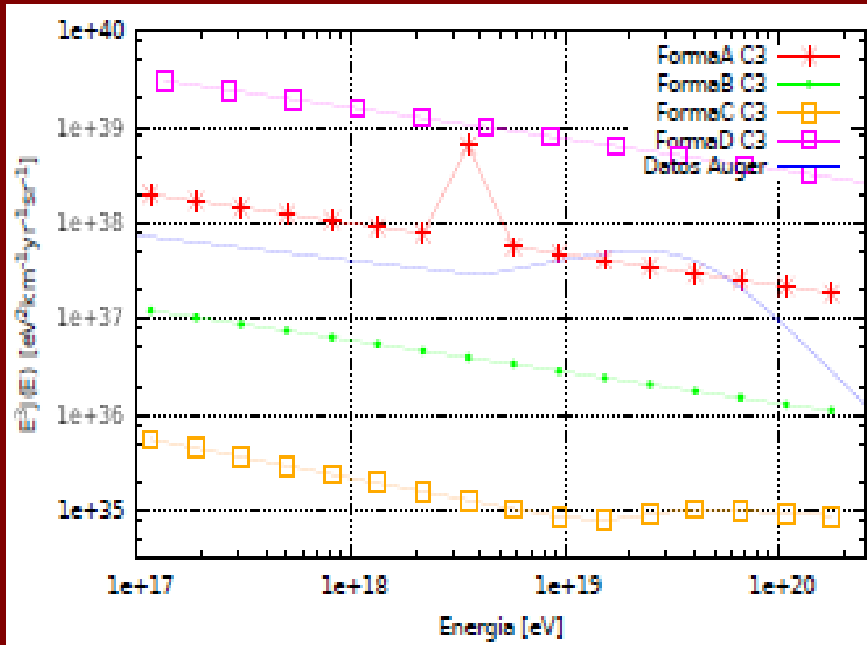
Establece una relación cuantitativa entre la estructura temporal y espectral de los GRBs.

Análisis de 62 GRBs de SWIFT 2006-2012



Complementary research topics

Galprop [Moskalenko & Strong (2000)] : simulations of propagation of UHECR [10^{17} , 10^{19}] eV extragalactic sources (M87, Circinus, Centaurus A) and anisotropic distribution



Study of the vicinity of GRBs hosts galaxies

56 GRBs from Savaglio catalog + SDSS (RS12)
Around a region of $10h^{-1}$ Mpc

(Fornengo, circular, galprop original models)



Incoming evenys 2017

7th School on Cosmic Rays and Astrophysics



VI School on Cosmic Rays and Astrophysics
Science for Development ICTP-UNACH-UNESCO Regional Seminar
Session Astroparticles

Sala de Usos Múltiples del MCTP, Ciudad Universitaria UNACH, Tuxtla Gutiérrez, Chiapas, México, November, 17th to 25th, 2015