$$E_{iso} = \frac{4\pi D_l^2}{(1+z)} \int_{1/1+z}^{10^4/1+z} EN(E)dE$$

$$E_{p,i} = E_{p,o}(1+z)$$

bell-shaped spectrum

Amati 2002
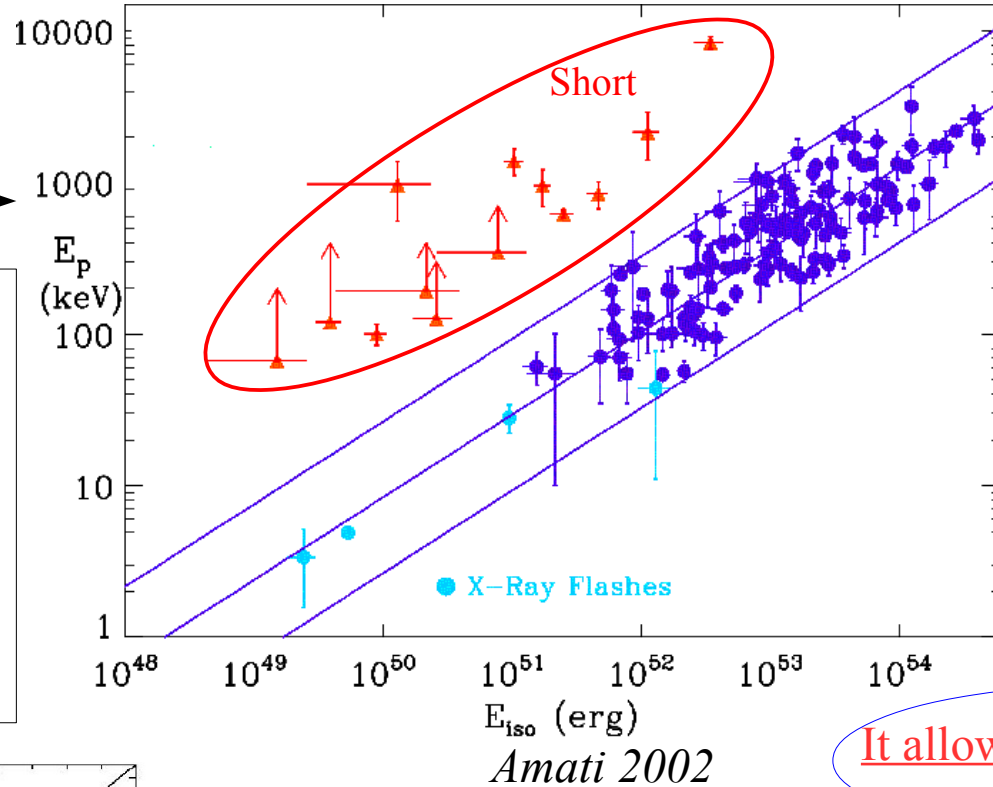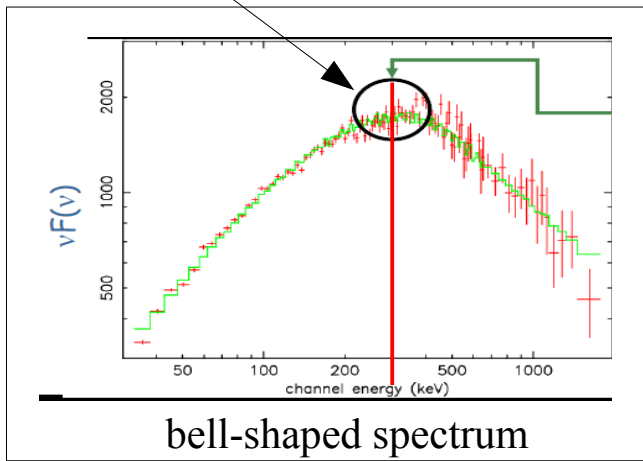
Interpretations:
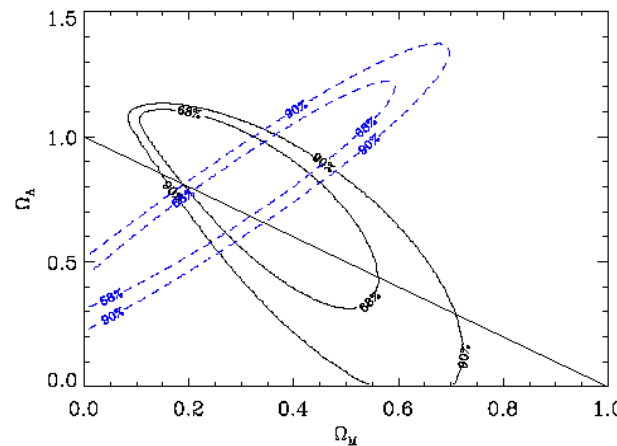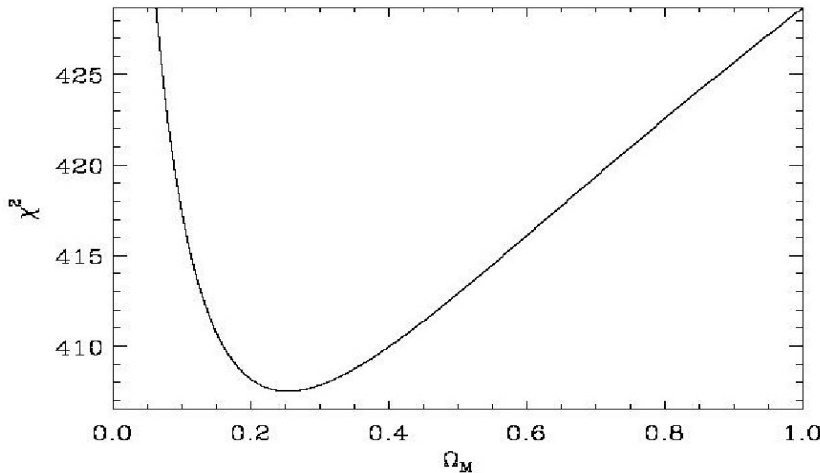
Meszaros & Zhang 2002, Thompson 2007

$$E_p \propto R_0^{-1/2} t_j^{-1/4} E_{iso}^{1/2}$$

Rees & Meszaros 2005

$$E_{pk} \propto \Gamma^{-2} t_{var}^{-1} L^{1/2}$$

But also: Lazzati et al. 2011, Titarchuk et al. 2012...ecc

It allow to standardize this sources!

The correlation allows to use long GRBs like **cosmological probes**. In this way we can estimate the cosmological parameters and we can compare these measures with the other ones estimated using different methods.

No-redshift data agree with the correlation parameters?

rest

observe

$E_{p,i}$ − Fluence (Band)

Nava et al. 2010
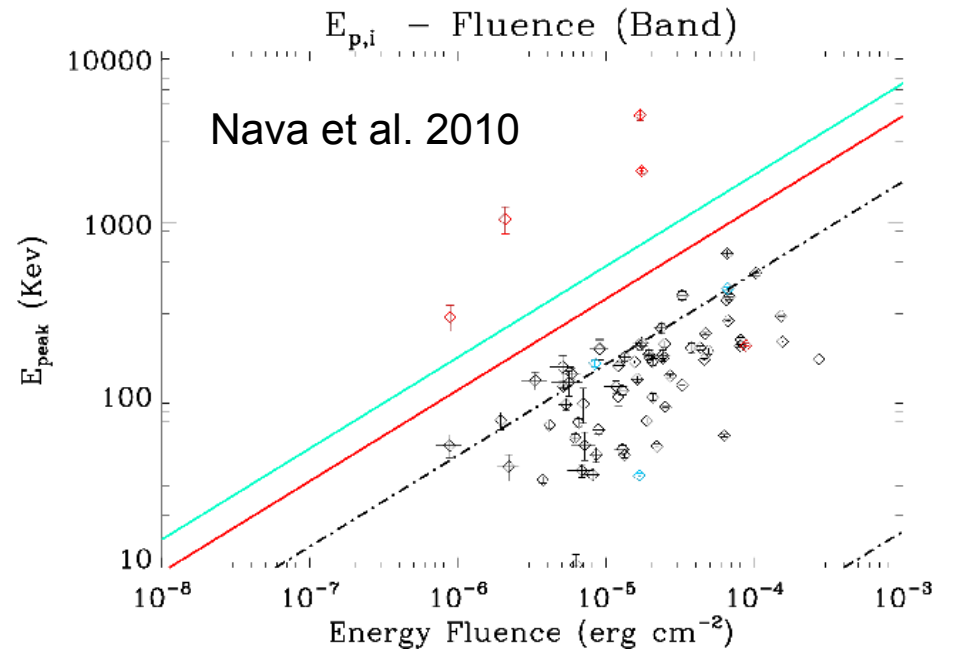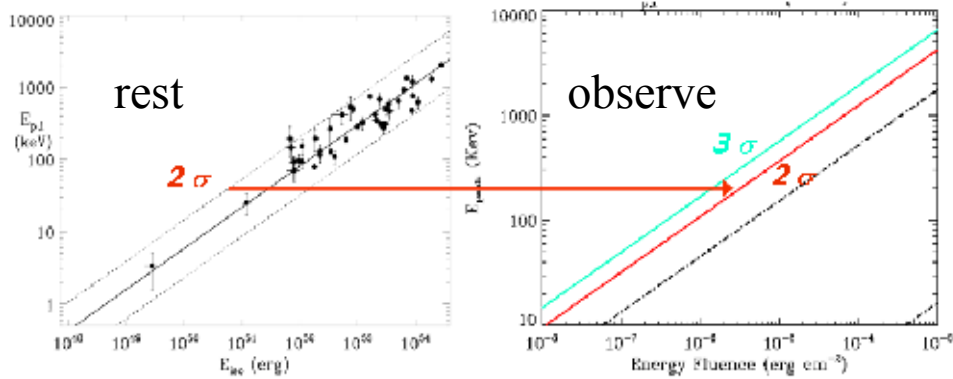
Instrumental thresholds

(Band, 2003)

Fermi-GBM
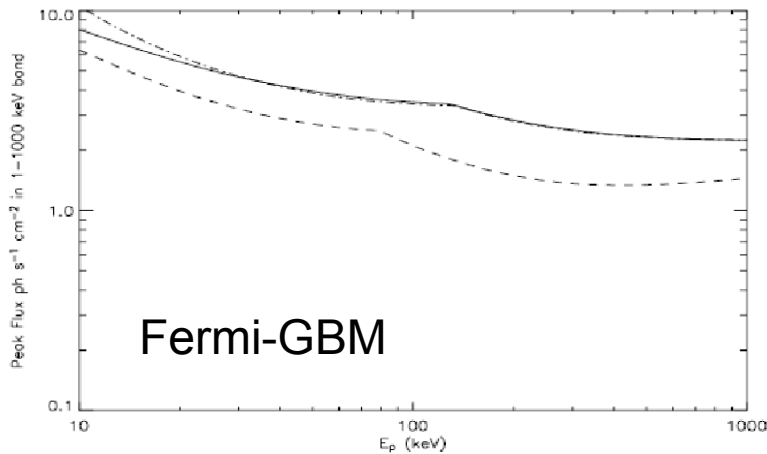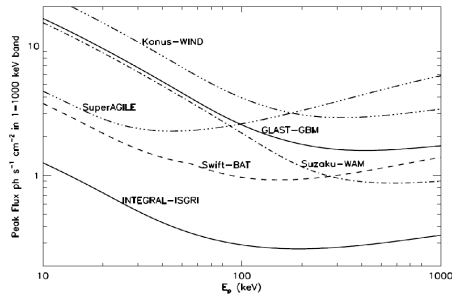
Ep-Eiso distribution resulting by the simulations (Fermi Thresholds)

$E_{p,i}$ − E_{iso}

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