

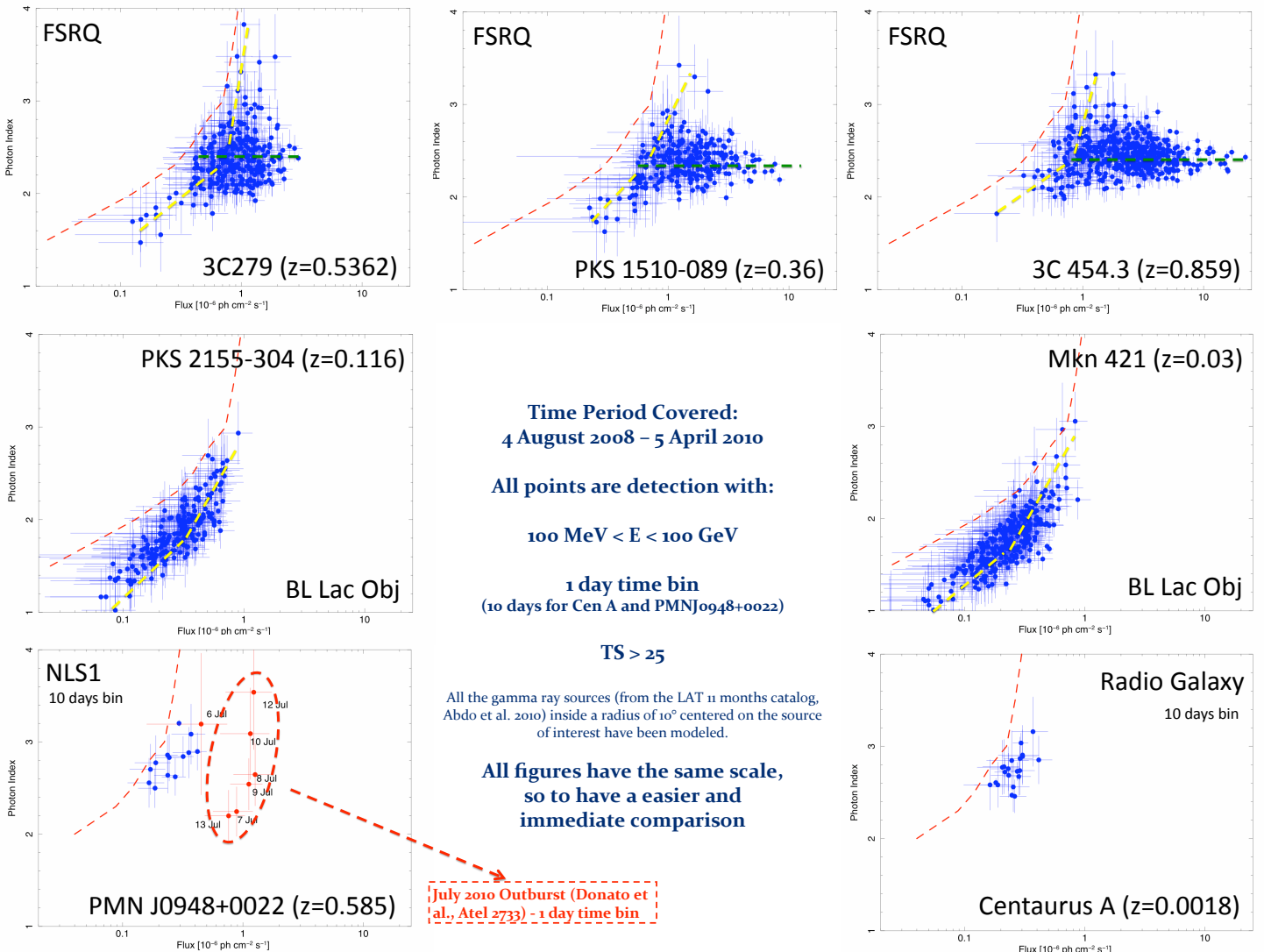
Patterns of variability in γ -ray Active Galactic Nuclei

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The huge public archive *Fermi* allows us to perform long term studies of the gamma-ray emission in some bright gamma-ray active galactic nuclei (AGN). Three brightest flat-spectrum radio quasars (3C 279, PKS 1510-089, 3C 454.3), two BL Lac Object (PKS 2155-304, Mkn 421), one radio galaxy (Cen A) and one gamma-ray narrow-line Seyfert 1 (PMN J0948+0022, Abdo et al. 2009, ApJ, 707, L142) have been selected.

Gamma-ray light curves in the 100 MeV – 100 GeV energy range with a time bin of 1 day (10 days in the case of Cen A and PMN J0948+0022, because of their weaker flux) have been extracted. The source emission has been modeled with a single power-law in the form $F(E) \propto E^{-\Gamma}$, where Γ is the photon index. The figures shown here display the flux vs the photon index for the selected sources plus the Vela pulsar, which has constant flux and index and therefore it is used as a calibration source. The dashed line indicates the LAT sensitivity for a 1 day exposure, as scaled from the 11 months survey data from Abdo et al., (2010, ApJ, 715, 429; Fig. 9). All points have been selected to have $TS > 25$ (see Mattox et al. 1996, for a definition of TS).



REMARKS:

- The first striking conclusion is that the gamma-ray flux vs photon index of FSRQ is different with respect to HBL. While the latter displays a tendency to be softer when greater, the former shows an indication of "saturation" as the flux increases. This is likely to be due to the appearance of a spectral break and therefore, when fitted with a single power-law model, the photon index value converges to a value that is in the "middle" of the two indexes, above and below the break.

- The NLS1 PMN J0948+0022 has low statistics, but a few days ago, it has an outburst (Donato et al., Atel 2733) reaching a flux in excess of 10^{-6} ph cm⁻² s⁻¹ (E>100 MeV). During the outburst, there is spectral variability (7 to 12 July and 12 to 13 July), although with negligible changes in flux.

- The Radio Galaxy Cen A has not sufficient statistics to show evident patterns.

- More details, including the analyses of simultaneous observations with *Swift*, will be presented in a forthcoming paper (Foschini et al., in preparation).

CONTROL SOURCE: VELA Pulsar

It is a constant source and therefore it is used for calibration purposes.

The γ -ray flux vs Γ shows the systematic fluctuations in the LAT performance.

Mean Flux std. dev.: 7.3%

Mean Γ std. dev.: 1.9%

