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## J/ApJ/771/57 Fermi-LAT flaring gamma-ray sources from FAVA (Ackermann+, 2013)

The Fermi All-sky Variability Analysis: a list of flaring gamma-ray sources and the search for transients in our galaxy.

Ackermann M., Ajello M., Albert A., Allafort A., Antolini E., Baldini L., Ballet J., Barbiellini G., Bastieri D., Bechtol K., Bellazzini R., Blandford R.D., Bloom E.D., Bonamente E., Bottacini E., Bouvier A., Brandt T.J., Bregeon J., Brigida M., Bruel P., Buehler R., Buson S., Caliandro G.A., Cameron R.A., Caraveo P.A., Cavazzuti E., Cecchi C., Charles E., Chekhtman A., Cheung C.C., Chiang J., Chiaro G., Ciprini S., Claus R., Cohen-Tanugi J., Conrad J., Cutini S., Dalton M., D'Ammando F., de Angelis A., de Palma F., Dermer C.D., Di Venere L., Drell P.S., Drlica-Wagner A., Favuzzi C., Fegan S.J., Ferrara E.C., Focke W.B., Franckowiak A., Fukazawa Y., Funk S., Fusco P., Gargano F., Gasparini D., Germani S., Giglietto N., Giordano F., Giroletti M., Glanzman T., Godfrey G., Grenier I.A., Grondin M.-H., Grove J.E., Guiriec S., Hadash D., Hanabata Y., Harding A.K., Hayashida M., Hays E., Hewitt J., Hill A.B., Horan D., Hou X., Hughes R.E., Inoue Y., Jackson M.S., Jogler T., Johannesson G., Johnson W.N., Kamae T., Kataoka J., Kawano T., Knodlseder J., Kuss M., Lande J., Larsson S., Latronico L., Lemoine-Goumard M., Longo F., Loparco F., Lott B., Lovellette M.N., Lubrano P., Mayer M., Mazzotta M.N., McEnery J.E., Michelson P.F., Mitthumsiri W., Mizuno T., Monte C., Monzani M.E., Morselli A., Moskalenko I.V., Murgia S., Nemmen R., Nuss E., Ohsugi T., Okumura A., Omodei N., Orienti M., Orlando E., Ormes J.F., Panequi D., Panetta J.H., Perkins J.S., Pesce-Rollins M., Piron F., Pivato G., Porter T.A., Raino S., Rando R., Razzano M., Reimer A., Reimer O., Romoli C., Roth M., Sanchez-Conde M., Scargle J.D., Schulz A., Sgro C., Siskind E.J., Spandre G., Spinelli P., Suson D.J., Takahashi H., Takeuchi Y., Thayer J.G., Thayer J.B., Thompson D.J., Tibaldo L., Tinivella M., Torres D.F., Tosti G., Troja E., Tronconi V., Usher T.L., Vandenbroucke J., Vasileiou V., Vianello G., Vitale V., Winer B.L., Wood K.S., Wood M., Yang Z.

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**ADC\_Keywords:** Gamma rays ; Active gal. nuclei ; Cross identifications

**Mission\_Name:** Fermi

**Keywords:** binaries: general; BL Lacertae objects: general; catalogs  
galaxies: active; stars: flare; surveys

**Abstract:**

In this paper, we present the Fermi All-sky Variability Analysis (FAVA), a tool to systematically study the variability of the gamma-ray sky measured by the Large Area Telescope on board the Fermi Gamma-ray Space Telescope. For each direction on the sky, FAVA compares the number of gamma-rays observed in a given time window to the number of gamma-rays expected for the average emission detected from that direction. This method is used in weekly time intervals to derive a list of 215 flaring gamma-ray sources. We proceed to discuss the 27 sources found at Galactic latitudes smaller than 10° and show that, despite their low latitudes, most of them are likely of extragalactic origin.

**Description:**

We applied FAVA (Fermi All-sky Variability Analysis) to the first 47 months of Fermi/LAT observations (2008 August 4 to 2012 July 16 UTC), in weekly time intervals. The total number of weeks is 206. We considered two ranges of gamma-ray energy,  $E > 100\text{MeV}$  and  $E > 800\text{MeV}$ , to increase the sensitivity for spectrally soft and hard flares, respectively. We generate measured and expected count maps with a resolution of  $0.25\text{deg}^2$  per pixel.

We found LAT counterparts for 192 of the 215 FAVA sources. Most of the associated sources, 177, are AGNs.

**File Summary:**

| FileName                   | Lrecl | Records | Explanations   |
|----------------------------|-------|---------|--|
| ReadMe                     | 80    | .       | This file  |
| <a href="#">table1.dat</a> | 85    | 215     | List of FAVA sources   |
| lcs/*                      | 0     | 216     | Plot of weekly flux variations for all 1FAV sources (PDF format) |

**See also:**

- [J/ApJS/199/31](#) : Fermi LAT second source catalog (2FGL) (Nolan+, 2012)
- [J/ApJ/756/33](#) : X-ray sources near 2 γ-ray sources (Cheung+, 2012)
- [J/A+A/548/A106](#) : PMN J0948+0022 radio-to-gamma-ray monitoring (Foschini+, 2012)
- [J/ApJ/743/171](#) : The 2LAC catalog (Ackermann+, 2011)
- [J/ApJ/742/66](#) : New Fermi/LAT extragalactic sources (Teng+, 2011)
- [J/ApJ/741/30](#) : Radio/γ-ray correlation in AGN (Ackermann+, 2011)
- [J/ApJ/722/520](#) : Gamma-ray light curves of Fermi blazars (Abdot+, 2010)

- [J/ApJ/722/L7](#) : Fermi/LAT detected MOJAVE AGNs (Pushkarev+, 2010)  
[J/ApJS/188/405](#) : Fermi-LAT first source catalog (1FGL) (Abdo+, 2010)  
[J/A+A/370/468](#) : Variability of gamma-ray sources (Torrest+, 2001)  
[J/ApJS/120/409](#) : The SMM Atlas of Gamma-Ray flares (Vestrand+, 1999)  
<http://www.asdc.asi.it/feratel/> : List of sources in Fermi LAT ATels

#### Byte-by-byte Description of file: [table1.dat](#)

| Bytes  | Format | Units | Label | Explanations  |
|--------|--------|-------|-------|---|
| 1- 8   | A8     | ---   | 1FAV  | FAVA identifier (JHHMM+DD)  |
| 10- 14 | F5.1   | deg   | GLON  | Galactic longitude  |
| 16- 20 | F5.1   | deg   | GLAT  | Galactic latitude   |
| 22- 24 | F3.1   | deg   | R68   | [0.1/0.8] Statistical position error at<br>68% confidence <a href="#">(1)</a> .   |
| 26- 28 | I3     | ---   | Nf    | [1/168] Total number of detected flares   |
| 30- 32 | I3     | ---   | Nhe   | [0/137] Number of flares with detections at<br>high energy                        |
| 34- 36 | I3     | ---   | Nneg  | [0/123] Number of flares corresponding to<br>negative flux variations             |
| 38- 40 | F3.1   | deg   | Rs    | [0.3/1.8] Distance between FAV and counterpart<br>source <a href="#">(2)</a> .    |
| 42- 58 | A17    | ---   | LAT   | Associated Fermi-LAT identifier (192 likely<br>counterpart) <a href="#">(2)</a> . |
| 60- 63 | I4     | ---   | ATel  | ? ATel publication number   |
| 65- 85 | A21    | ---   | Assoc | Associated object at longer wavelength  |

**Note (1):** The systematic error on the source position is 0.1°.

**Note (2):** We looked for associations of FAVA sources with previously known variable LAT sources. We searched for counterparts within radius Rs, which is derived as the 99% statistical error plus the systematic error. Rs was deliberately chosen to be large, to include all possible counterparts. In cases for which more than one counterpart is found within Rs, we consider the closest one. We note that the associations were made purely on the basis of positional coincidence. We therefore caution that the associated sources should be considered as likely counterparts only. For a more confident source association, temporal and spectral information need to be considered. See section 3.

#### History:

From electronic version of the journal for the table.  
lcs files downloaded at [https://www-glast.stanford.edu/pub\\_data/585/](https://www-glast.stanford.edu/pub_data/585/)

(End)

Emmanuelle Perret [CDS] 16-Jan-2015

The document above follows the rules of the [Standard Description for Astronomical Catalogues](#); from this documentation it is possible to generate f77 program to load files [into arrays](#) or [line by line](#)