Preliminary results from the Mrk421 MW campaign 2013

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MW campaign 2013

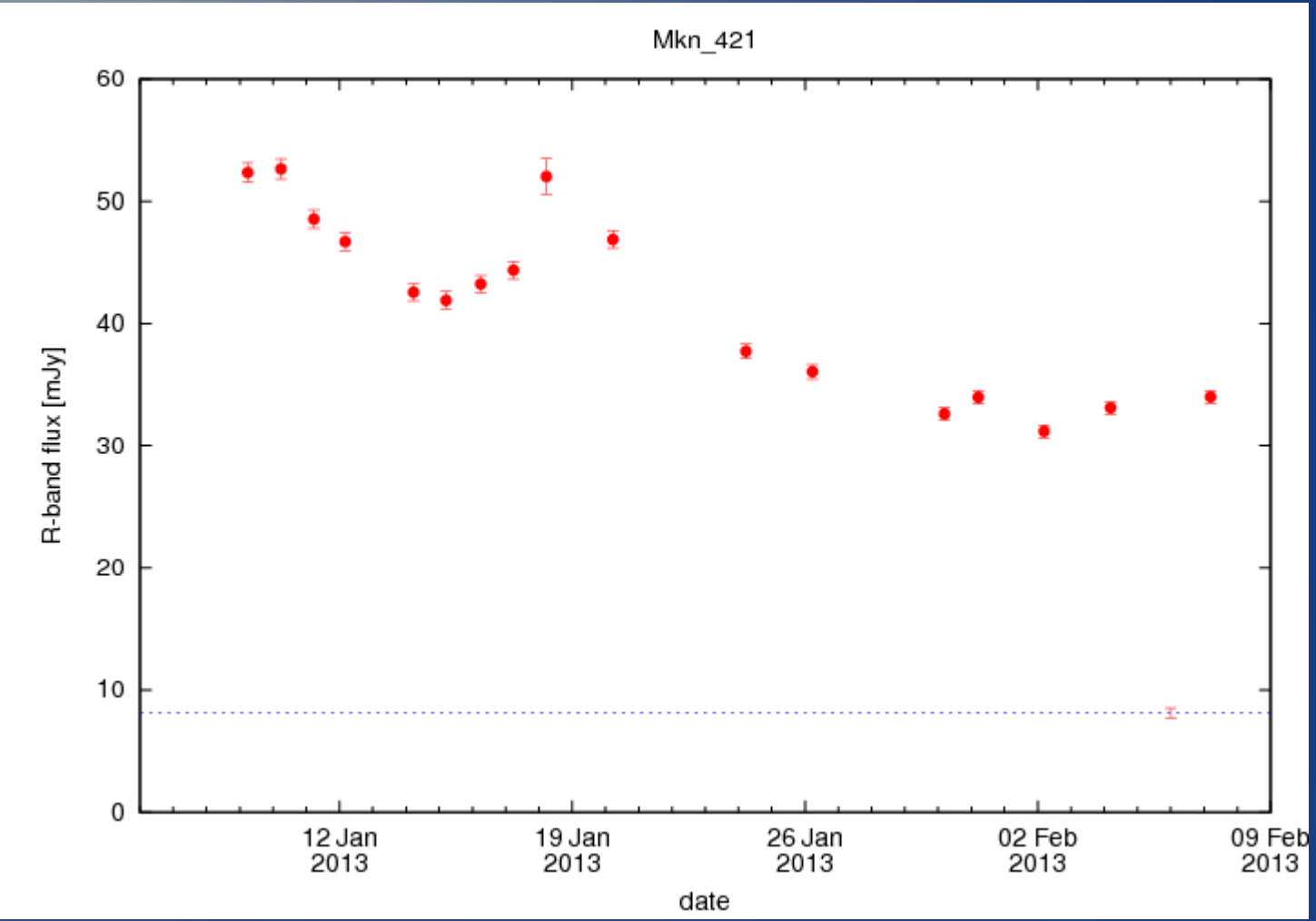
2013/02/05	**56328**	**Metsahovi**; --- / ---	**Perkins_PRISM**; --- / ---	------	**Fermi-LAT**; 00:00 / 23:59	------
			TUG_T60; --- / ---			
2013/02/06	**56329**	**Metsahovi**; --- / ---	**Swift_UVOT**; --- / ---	**NuSTAR**; 01:00 / 11:00	**Fermi-LAT**; 00:00 / 23:59	**MAGIC**; 02:00 / 03:00
			Perkins_PRISM; --- / ---	**Swift_XRT**; --- / ---		**MAGIC** ; 03:40 / 04:40
			TUG_T60; --- / ---			**VERITAS**; 07:30 / 11:00
2013/02/07	**56330**	**Metsahovi**; --- / ---	**Perkins_PRISM**; --- / ---	------	**Fermi-LAT**; 00:00 / 23:59	------
			TUG_T60; --- / ---			
2013/02/08	**56331**	**Metsahovi**; --- / ---	**Swift_UVOT**; --- / ---	**Swift_XRT**; --- / ---	**Fermi-LAT**; 00:00 / 23:59	**VERITAS**; 07:20 / 11:20
			Perkins_PRISM; --- / ---			
			TUG_T60; --- / ---			
2013/02/09	**56332**	**Metsahovi**; --- / ---	**TUG_T60**; --- / ---	------	**Fermi-LAT**; 00:00 / 23:59	------
2013/02/10	**56333**	**Metsahovi**; --- / ---	**Swift_UVOT**; --- / ---	**Swift_XRT**; --- / ---	**Fermi-LAT**; 00:00 / 23:59	**MAGIC**; 02:45 / 03:15
			TUG_T60; --- / ---			
2013/02/11	**56334**	**Metsahovi**; --- / ---	**TUG_T60**; --- / ---	------	**Fermi-LAT**; 00:00 / 23:59	------
2013/02/12	**56335**	**Metsahovi**; --- / ---	**Swift_UVOT**; --- / ---	**NuSTAR**; 01:00 / 11:00	**Fermi-LAT**; 00:00 / 23:59	**MAGIC**; 01:55 / 02:55
			Perkins_PRISM; --- / ---	**Swift_XRT**; --- / ---		**MAGIC** ; 03:35 / 04:35
			TUG_T60; --- / ---			**VERITAS**; 07:00 / 11:00

- 6 months campaign
- Observation schedule available on-line and updated constantly
  www.slac.stanford.edu/~dpaneque/MW_Mrk421_2013/Obs.html
- Only some instruments are listed (not every instrument can provide the schedule due to logistic problems)
- 30 hours of observations with MAGIC
- ~30 instruments involved
- Special agreement among Swift, NuSTAR, MAGIC and VERITAS

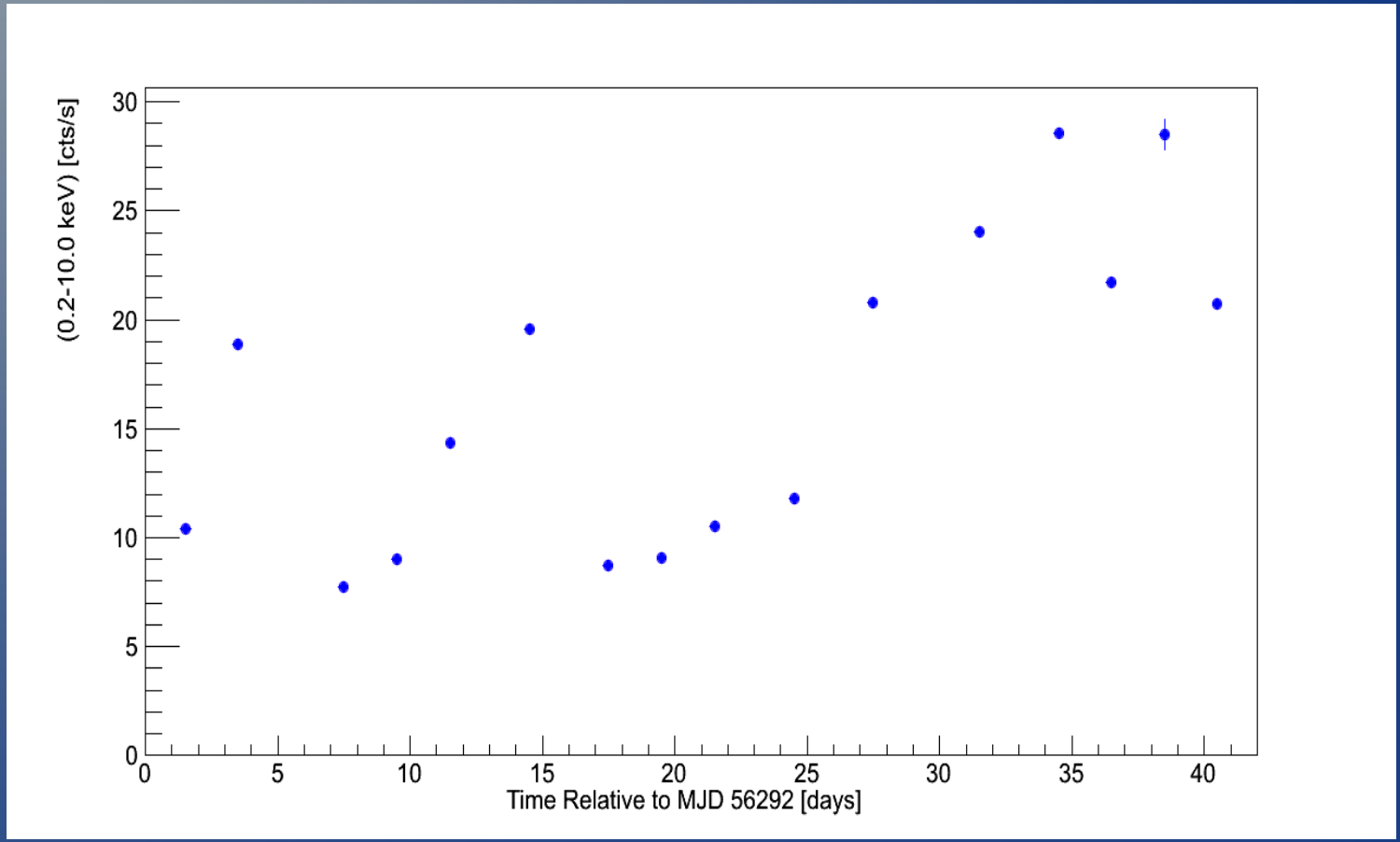
New instruments

- We will have, for the first time, observations with NuSTAR, which will cover with high sensitivity the hard-X range
- Thus, together with MAGIC, we will be able to characterize the temporal evolution of the distribution of the highest energy particles even in the typical state of Mrk421
- ~130 hours of observations contemporary with MAGIC (~3 observations of 10 hours each per month, from January till May)
- Highly sensitive optical telescopes (TUG60 and TUG100) will perform contemporary observations with MAGIC and NuSTAR in order to study the intra-night optical variability

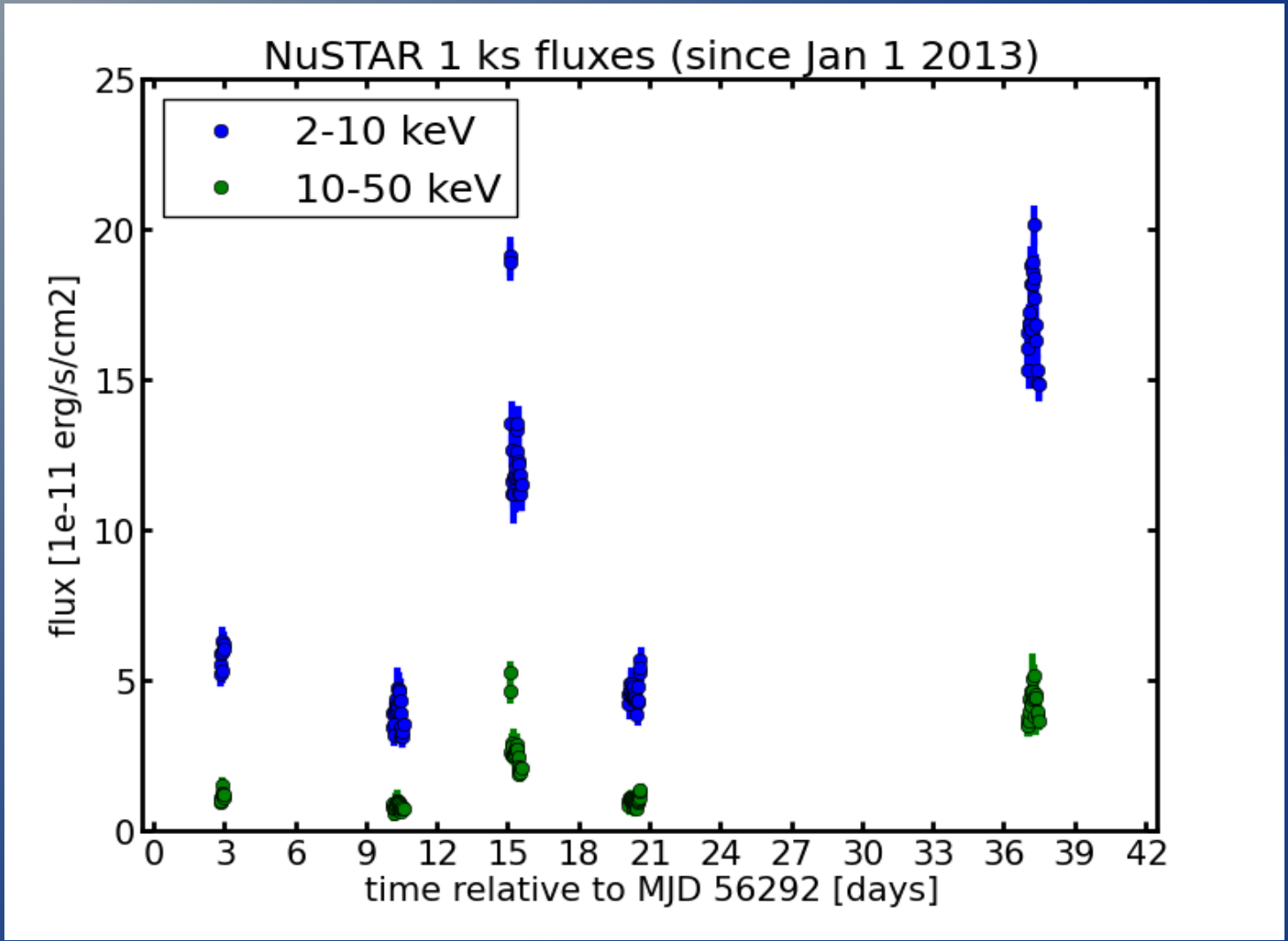
KVA


Mkn_421
R-band flux [mJy]
60
50
40
30
20
10
0
12 Jan 2013
19 Jan 2013
26 Jan 2013
02 Feb 2013
09 Feb 2013
date

Swift/XRT

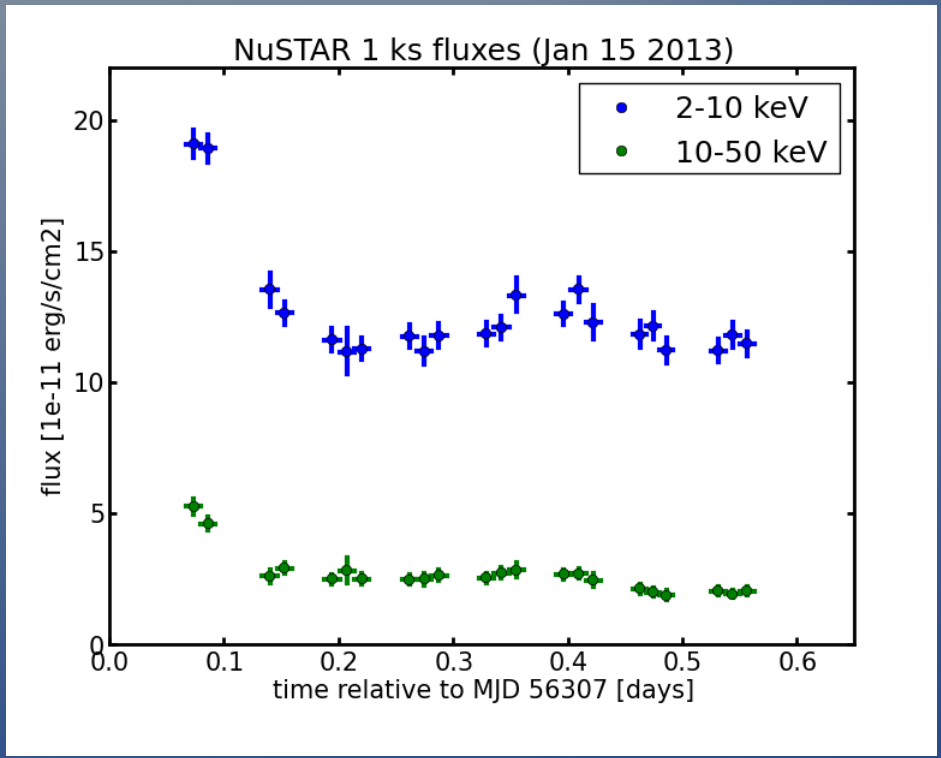

(0.2-10.0 keV) [cts/s]
0
5
10
15
20
25
30
0
5
10
15
20
25
30
35
40
Time Relative to MJD 56292 [days]

NuSTAR



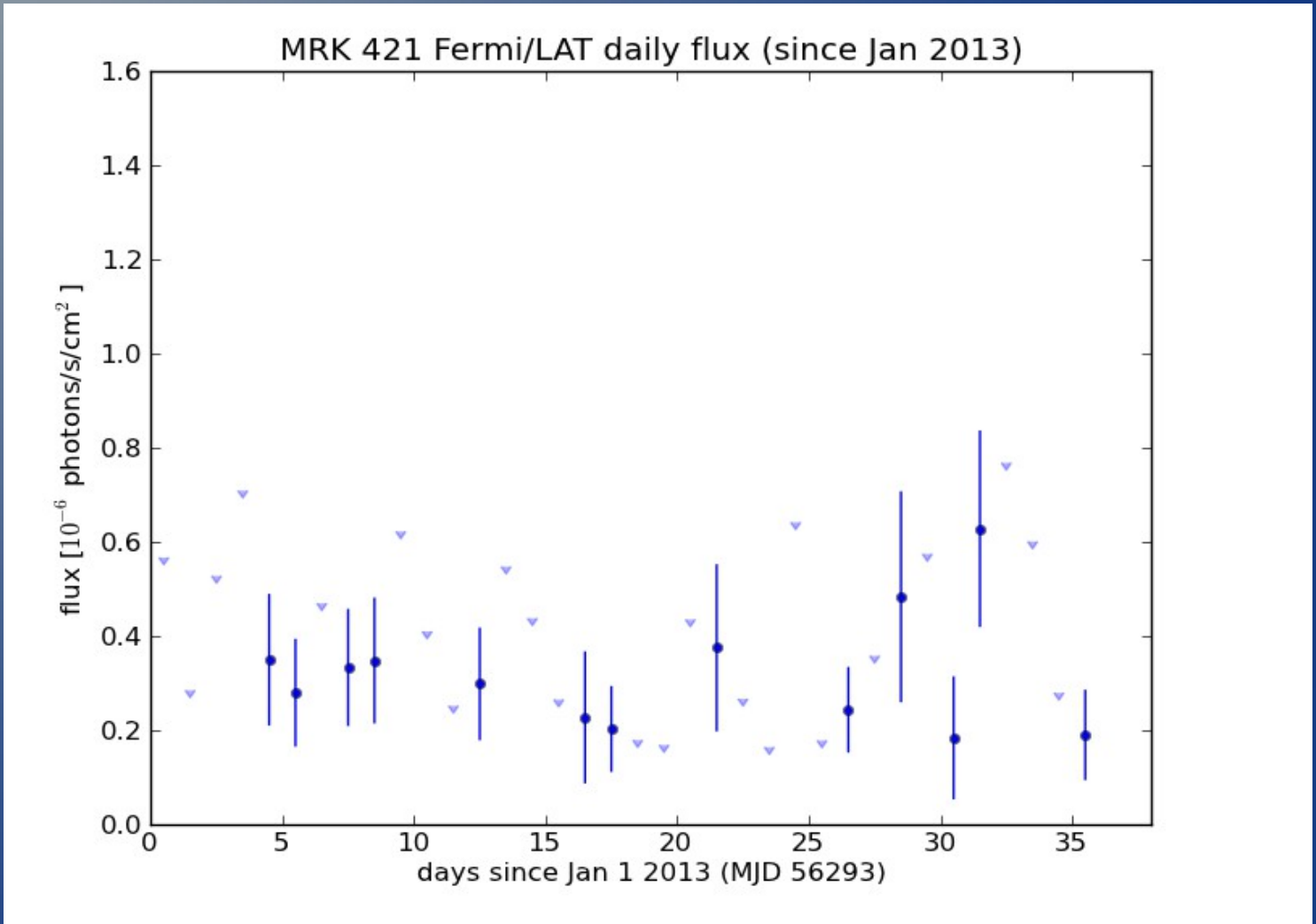
Data reduced by Mislav Balokovic (PhD student at Caltech)

NuSTAR

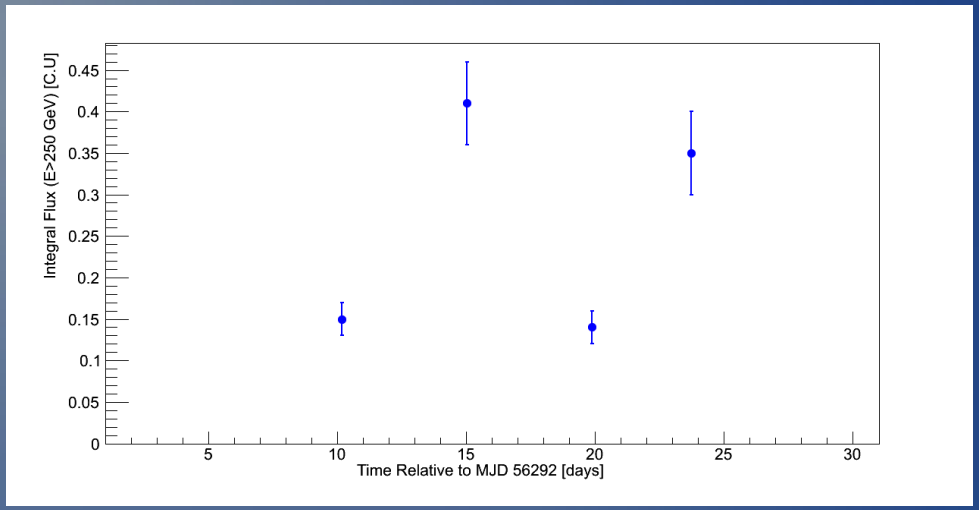


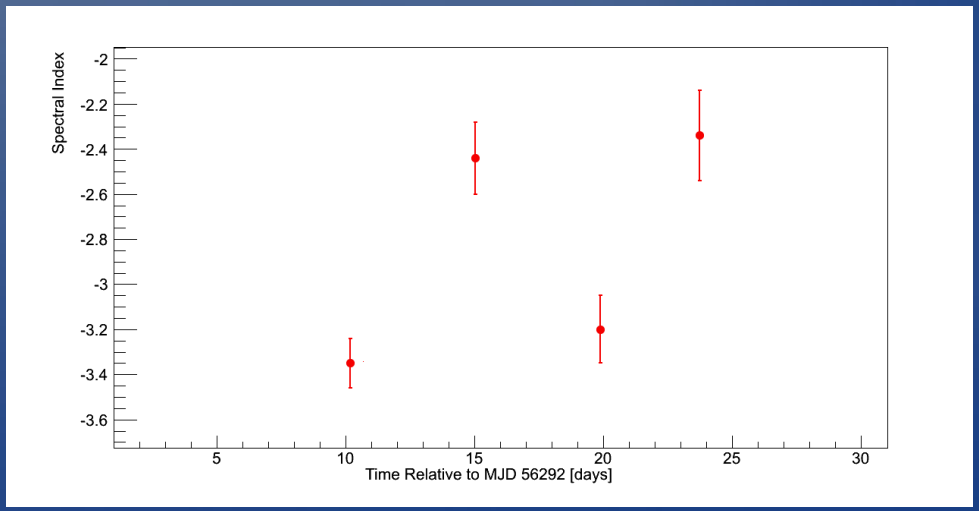
- On the 15th of January intra-night hard X-ray variability
- Each point corresponds to ~20 minutes of observations
- Tiny error bars even though the source was not in high state
- Unfortunaly, no MAGIC observations contemporary with the intra-night peak

Fermi-LAT


MRK 421 Fermi/LAT daily flux (since Jan 2013)
flux [10^{-6} photons/s/cm^2]
days since Jan 1 2013 (MJD 56293)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
0
5
10
15
20
25
30
35

MAGIC


Integral Flux (E>250 GeV) [C.U]
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
5
10
15
20
25
30
Time Relative to MJD 56292 [days]


Spectral Index
-2
-2.2
-2.4
-2.6
-2.8
-3
-3.2
-3.4
-3.6
5
10
15
20
25
30
Time Relative to MJD 56292 [days]

Summary

[2013-02-04 00:39:17]
Weather and rates update
L3: 260
L1: 7k
wind: 10km/h
humidity: 1%
temperature: 10deg
lidar: no clouds and maybe a tiny bit of calima

[2013-02-04 01:49:17]
We are now observing Mrk421 in W1.
L3 rate is 270Hz
L1 at 4k in both
weather basically unchanged all the time
wind: 10km/h
temp: 9deg
hum: 1%
lidar: no clouds exept for some really tiny structure below 2km

[2013-02-04 01:50:24]
Mola shows 10 sigma in 5min now.

[2013-02-04 01:53:21]
LabVIEW error DAQ crash ...

[2013-02-04 01:55:46]
We will observe another 5min in W1 and will then wobble bz hand to W2.

[2013-02-04 02:02:35]
Now observing in W2 for the next 13 min

[2013-02-04 02:14:38]
Mola says 15 sigma in 12 min now for Mrk 421.

- During January 2013, Mrk421 was in low state
- February MAGIC data are missing in the PIC Database
- Mola showed high activity on the 4th and on the 6th of February
- The first paper of the campaign is expected to be submitted in two months
- I will provide to NuSTAR Collaboration the MAGIC spectra and light curves
- Need of a fast cross-check
- Long term and extensive campaign, plenty of data, several publications expected