

ANALYSIS OF 1ES0229+200

Preliminary results

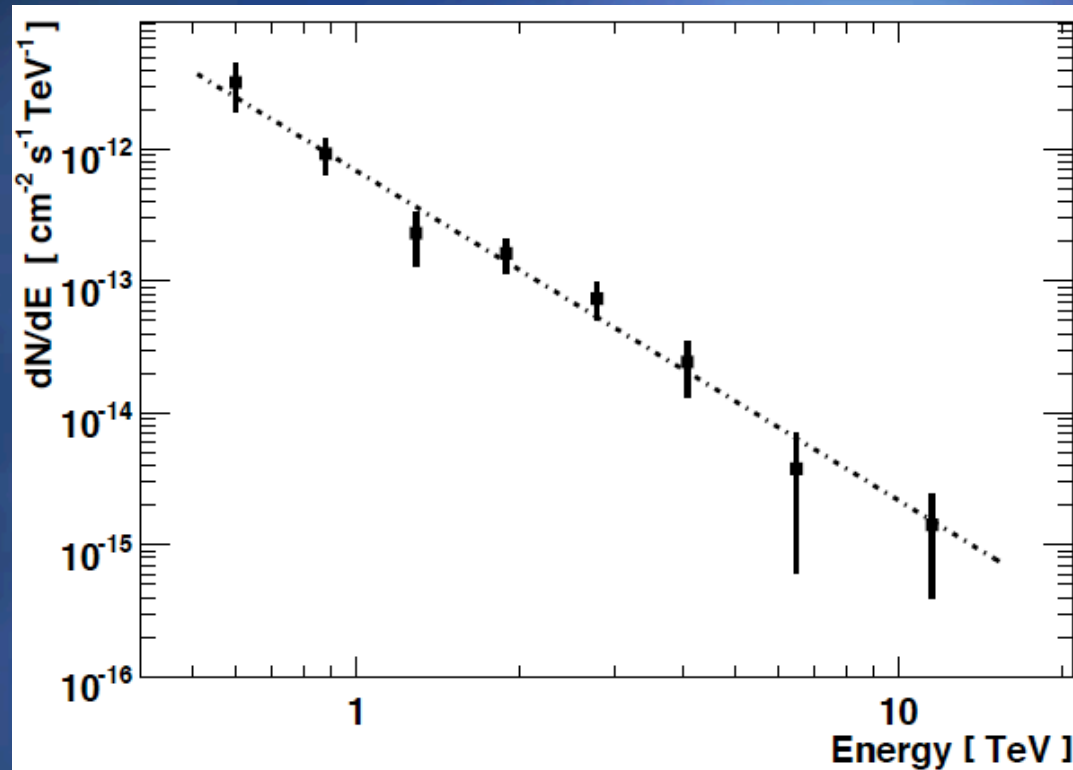
Adiv González Muñoz

MAGIC AGN MEETING, Frascati, February 2013

1ES0229+200

- ⊕ Redshift $z = 0.14$
- ⊕ Proposed for MWL observation (PI, Karsten Berger)
- ⊕ Proposed as part of the KP for studies of the EBL.
- ⊕ Source already detected by HESS in 42 hours between 2005 and 2006 with $6.6 \sigma^*$.

1ES0229+200 spectrum by HESS

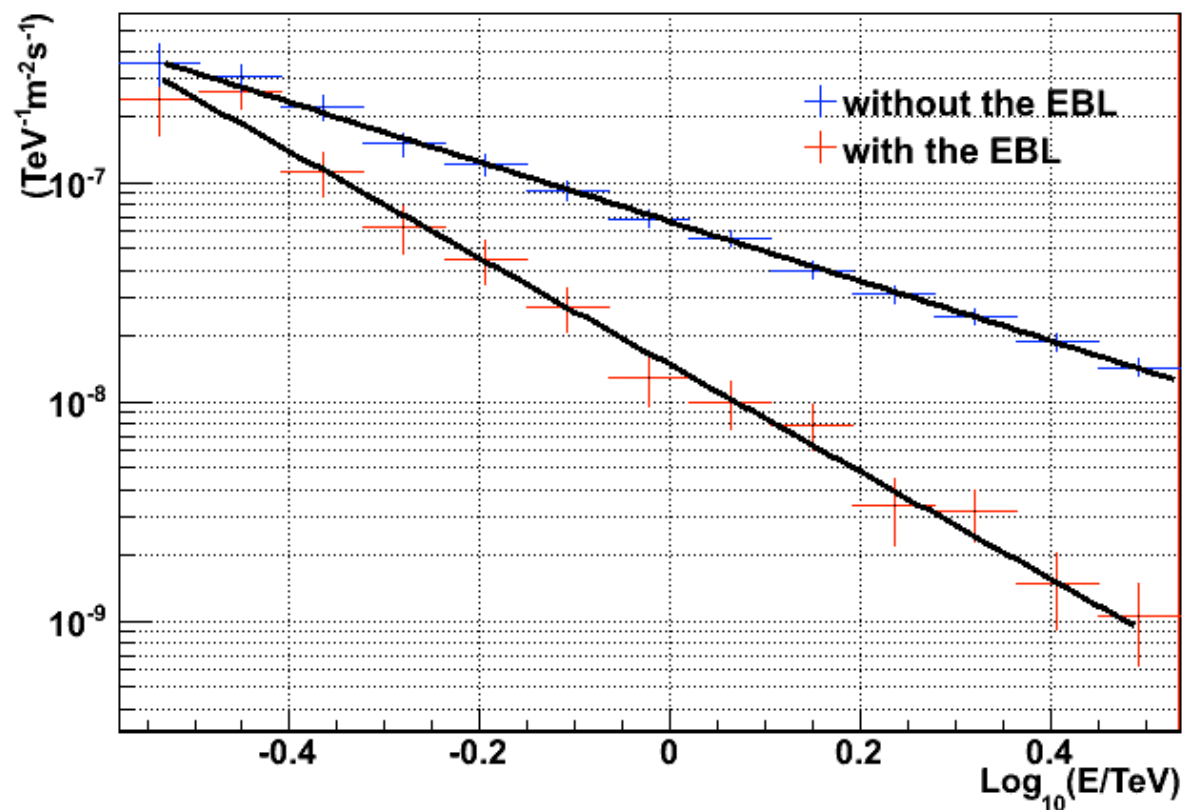


⊕ Best fit with a power law spectrum with index
 $\Gamma = 2.50 \pm 0.19_{\text{stat}} \pm 0.10_{\text{syst}}^*$

*F. Aharonian et al. 2007, *A&A*, 475, L9

1ES0229+200

50 hrs observation of 1ES0229+200 with MAGIC



From simulation: detection with 5σ in 6 h ($E > 0.32$ TeV) $N_{\text{exc}} = 57$, $N_{\text{BG}} = 72$

Intrinsic spectrum (from FERMI): power-law with index 1.36

From simulation: observed spectrum in 50 hrs, power-law fit with index 2.44 ± 0.11

Crab Nebula crosscheck analysis

- ⊕ Selected dates:

 - ⊕ 2012_11_12

 - ⊕ 2012_12_16

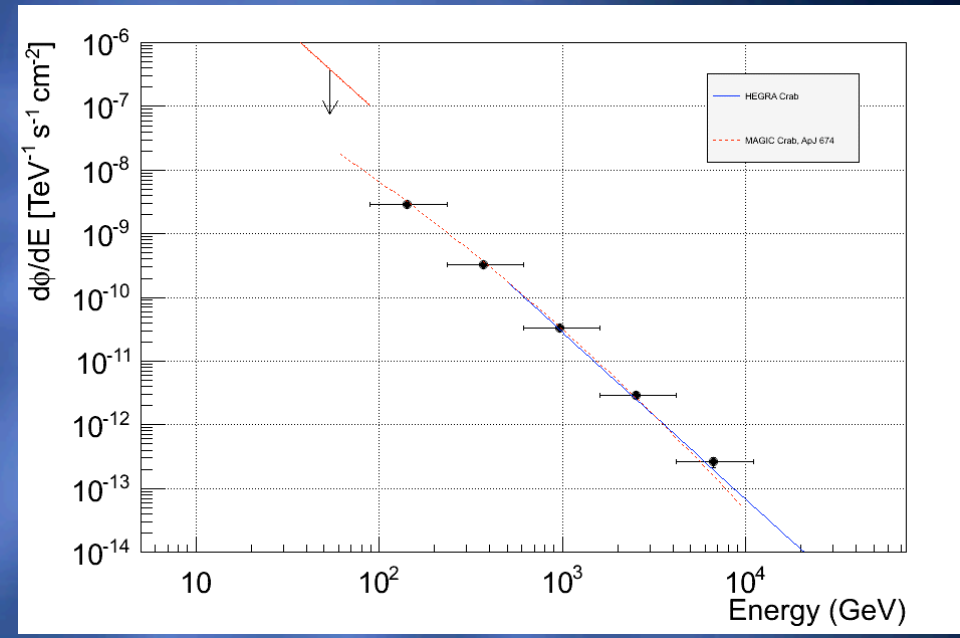
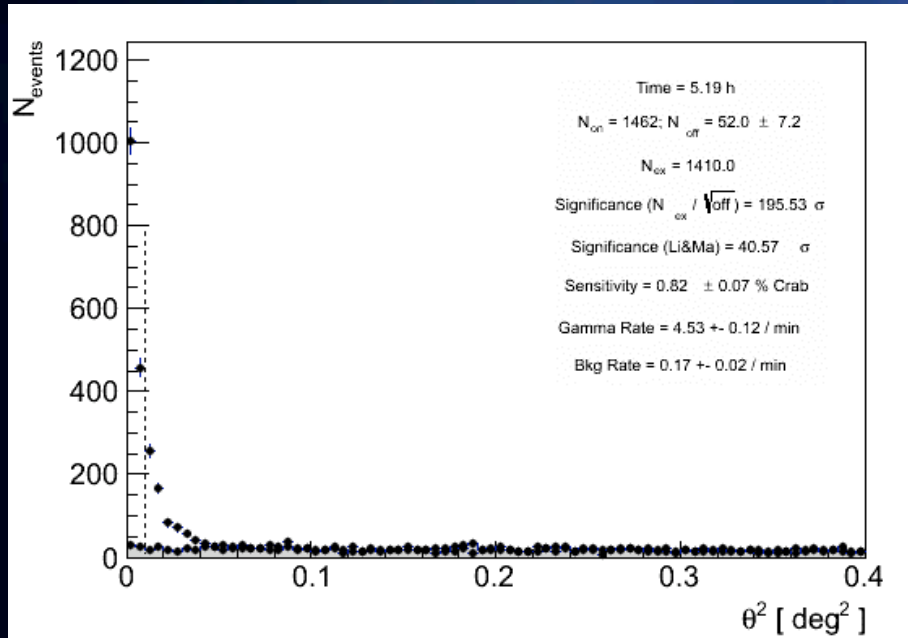
 - ⊕ 2013_01_10

- ⊕ MC used from last production, optimized for telescope conditions from October 2012 and corrected by J. Sitarek

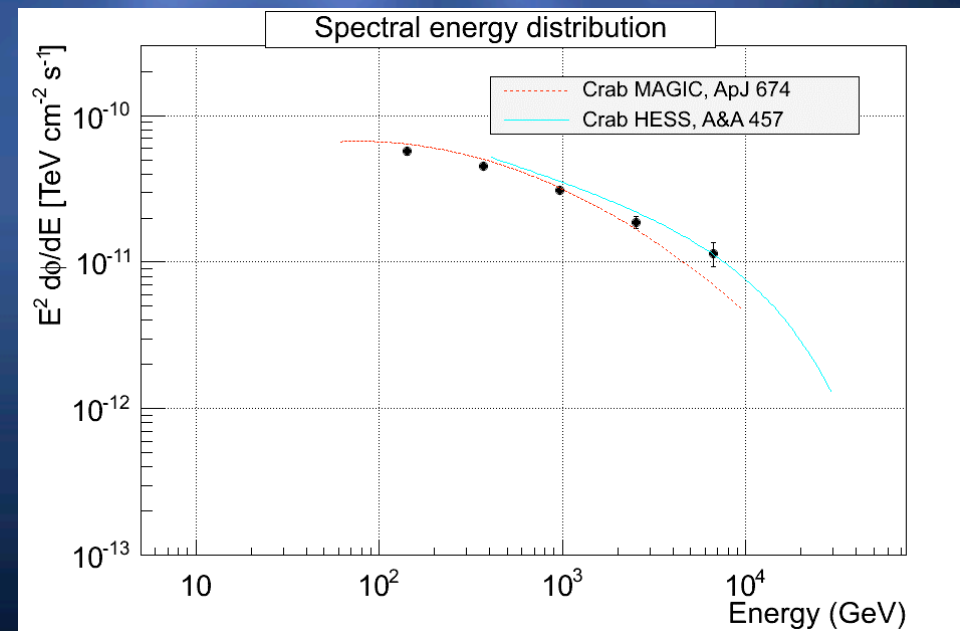
- ⊕ RF, disp1, disp2 and Energy Table provided by J. Sitarek from his analysis of Crab Nebula

- ⊕ Analysis with MARS 2.11.2

Crab Nebula crosscheck analysis



FR standard cuts in Odie
 Time: 5.19 hrs
 $N_{\text{on}} = 1462$; $N_{\text{off}} = 52 \pm 7.2$
 Significance (Li & Ma): 40.57 σ
 Sensitivity: 0.82 \pm 0.07 % Crab
 Gamma Rate = 4.53 \pm 0.12 /min
 Bkg Rate = 0.17 \pm 0.02 /min

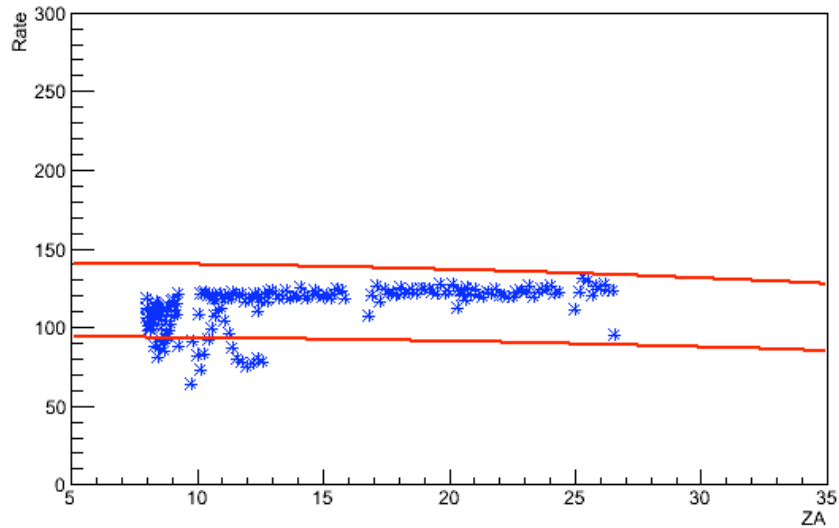


DATA TAKEN

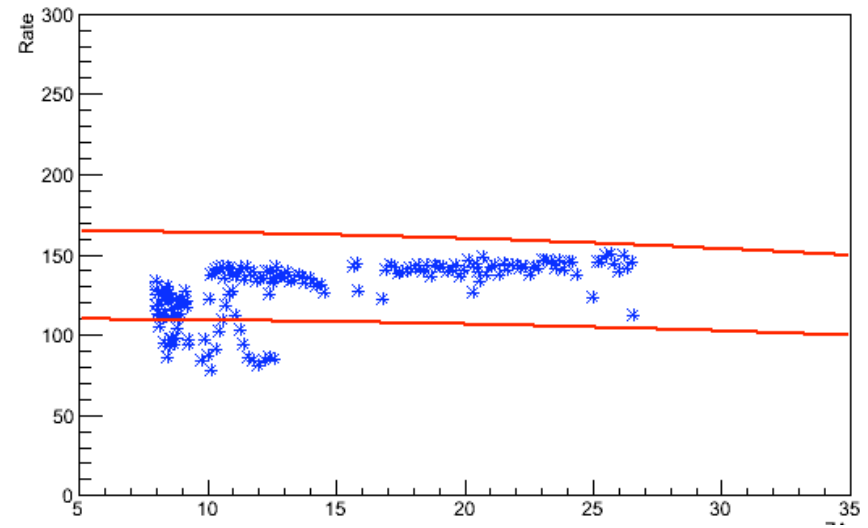
Date	Atm. cond.	Problems
⊕ 2012_11_13	OK	Starguider 2
⊕ 2012_11_16	OK	
⊕ 2012_12_16	Clouds	Starguider 1.
⊕ 2012_12_17	OK	
⊕ 2013_01_06	OK	Drive 1 error
⊕ 2013_01_07		MONO DATA
⊕ 2013_01_08	Clouds	
⊕ 2013_01_10		Not observed at all, late start up
⊕ 2013_01_11	OK	Start up not in time, Drive 1, DAQ 1
⊕ 2013_01_12	OK	Start up not in time, Drive 1
⊕ 2013_01_13	OK	Drive 1, GPS

STRANGE RATE BEHAVIOR

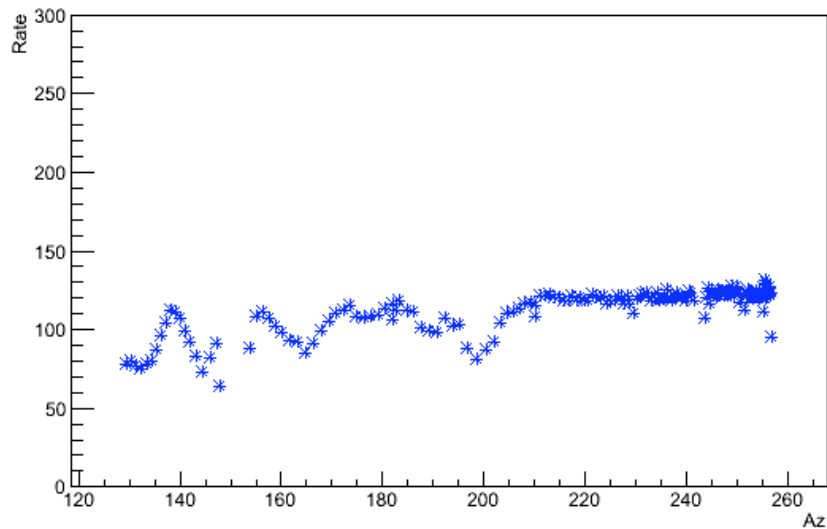
Rate vs Zenith Angle-M1-1ES0229-2012_12_16



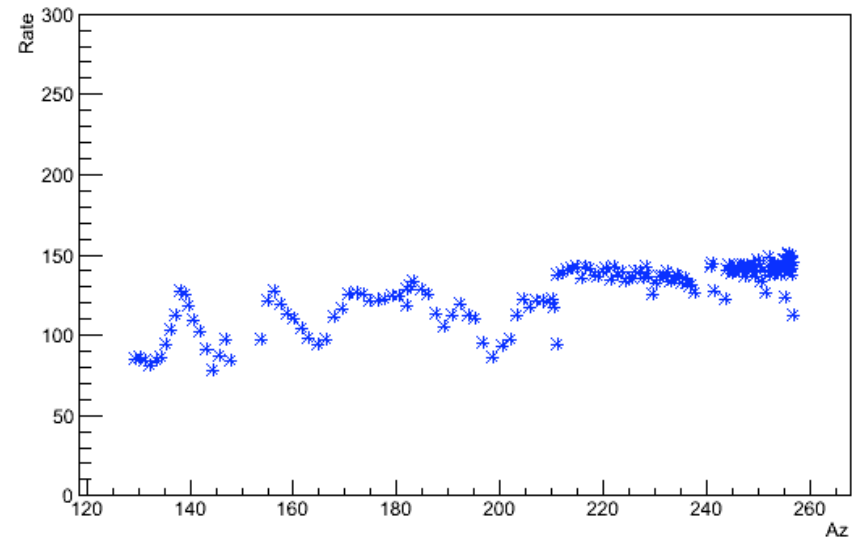
Rate vs Zenith Angle-M2-1ES0229-2012_12_16



Rate vs Azimuthal Angle-M1-1ES0229-2012_12_16

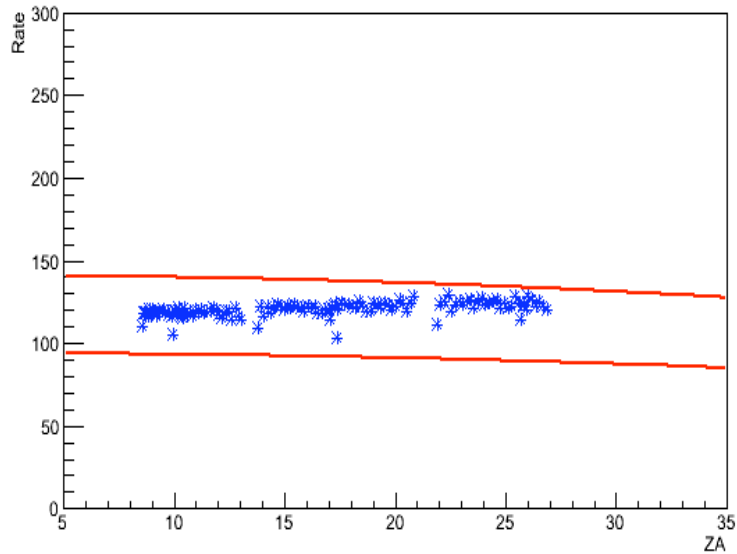


Rate vs Azimuthal Angle-M2-1ES0229-2012_12_16

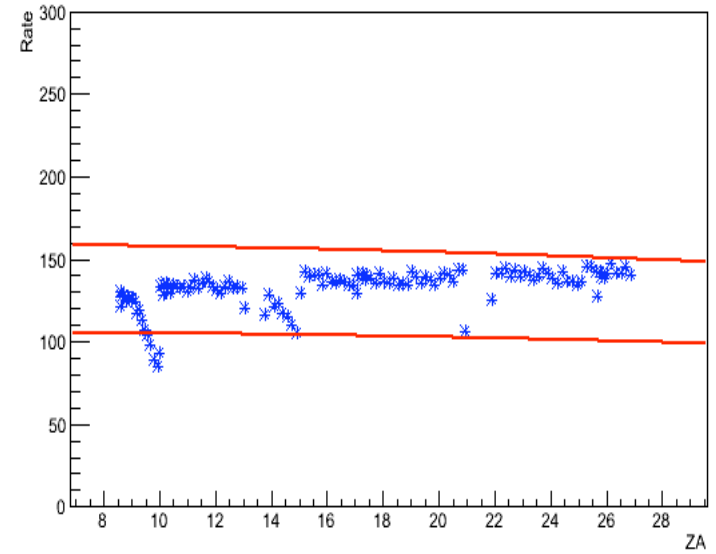


STRANGE RATE BEHAVIOR

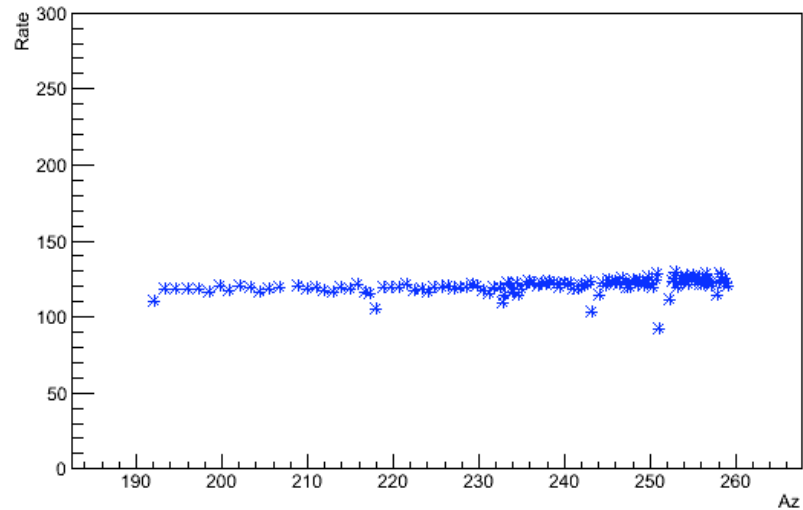
Rate vs Zenith Angle-M1-1ES0229-2012_12_17



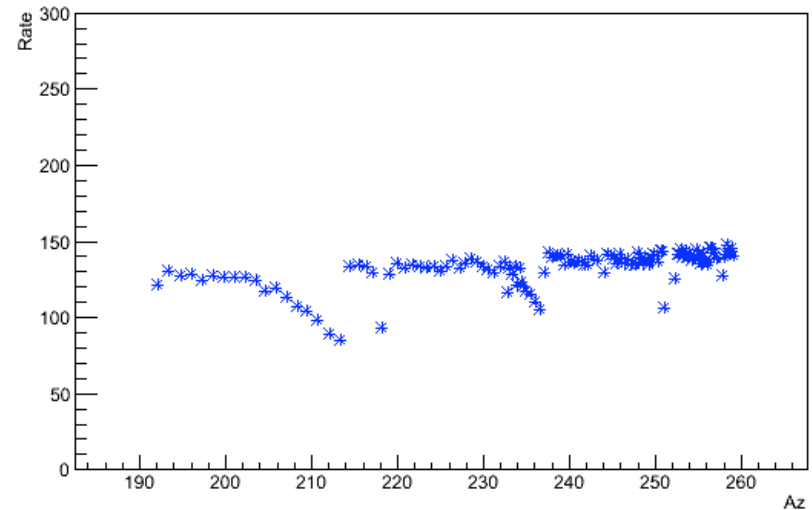
Rate vs Zenith Angle-M2-1ES0229-2012_12_17



Rate vs Azimuthal Angle-M1-1ES0229-2012_12_17



Rate vs Azimuthal Angle-M2-1ES0229-2012_12_17



1ES0229+200

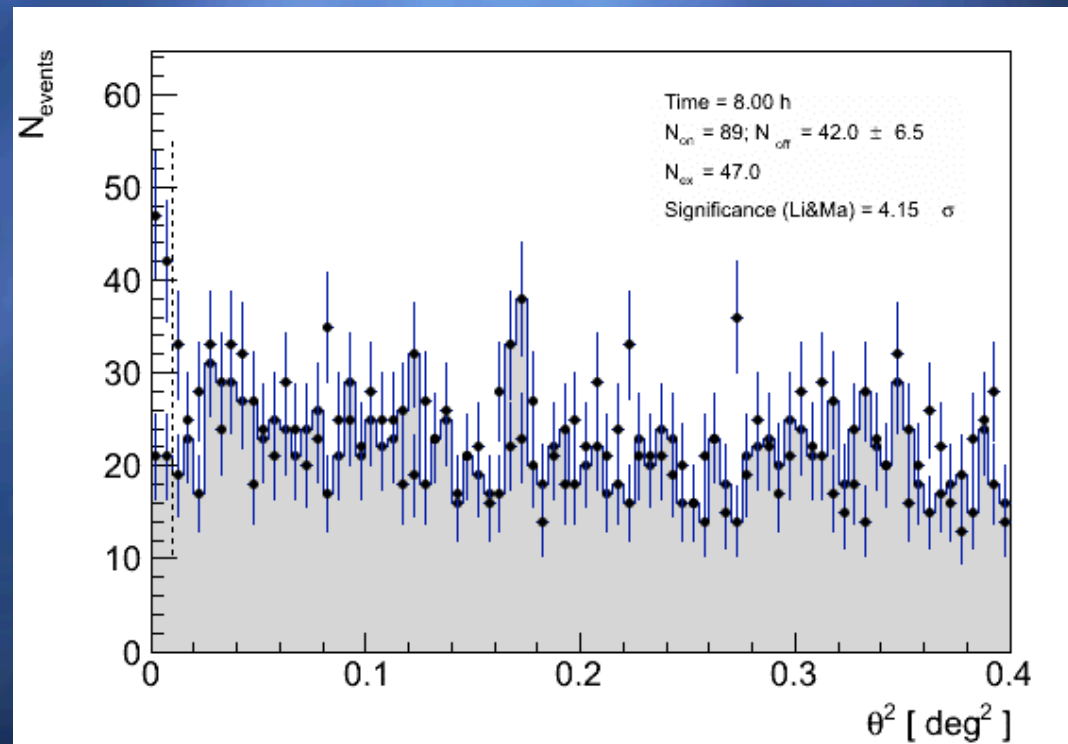
- ⊕ Analysis with MARS 2.11.2
- ⊕ Same MC as for the CrabNebula analysis
- ⊕ Standard cuts in Odie for the full energy range.

For all data

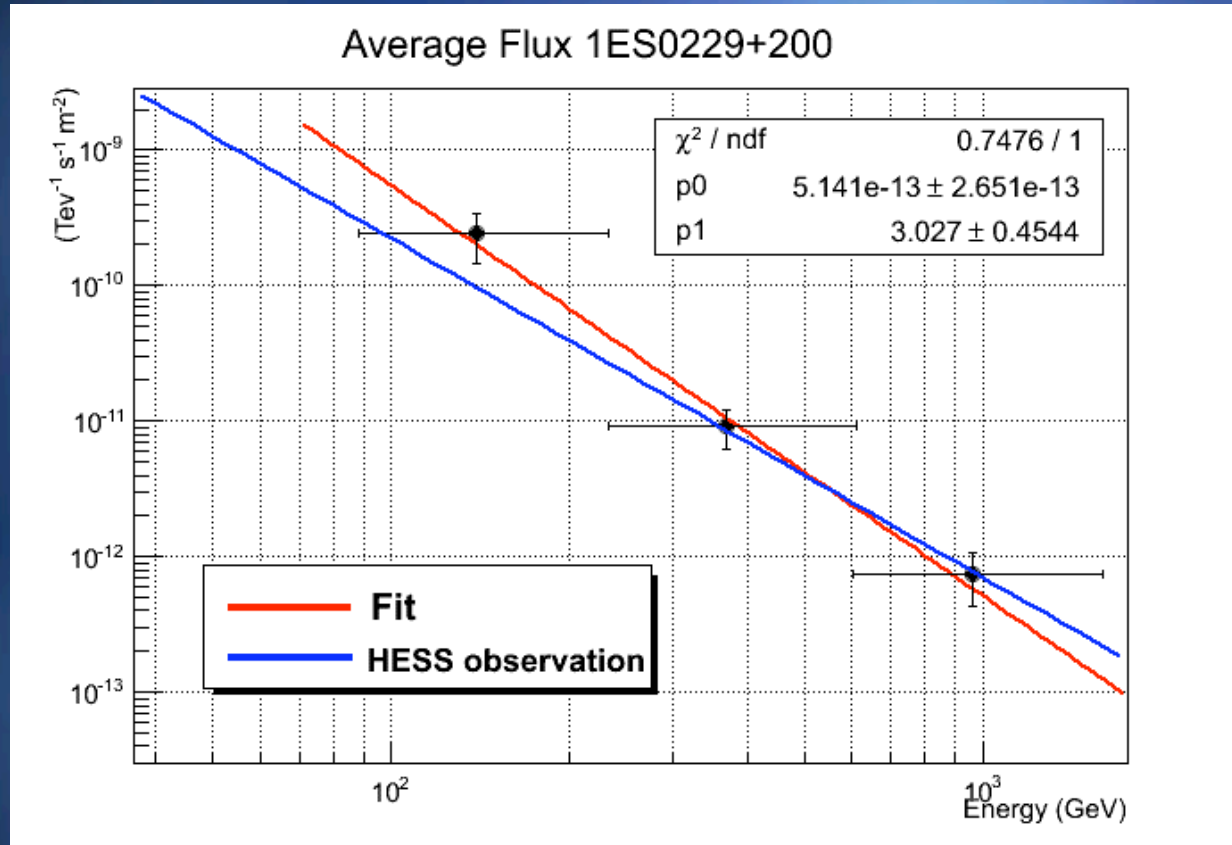
Time: 8.00 h

$N_{\text{on}} = 89$; $N_{\text{off}} = 42$

$\text{Sig}(\text{Li} \ \& \ \text{Ma}) = 4.15 \ \sigma$

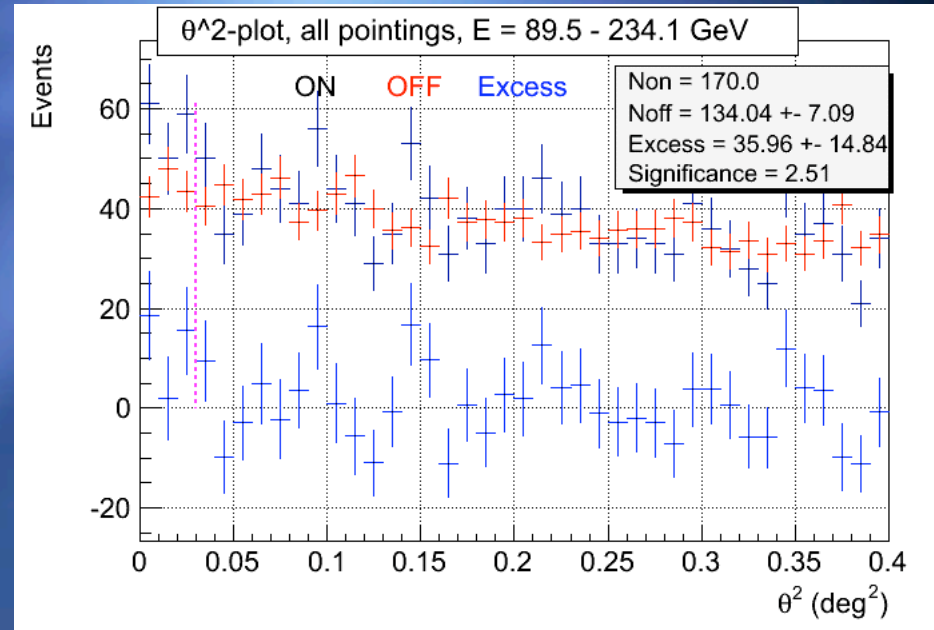
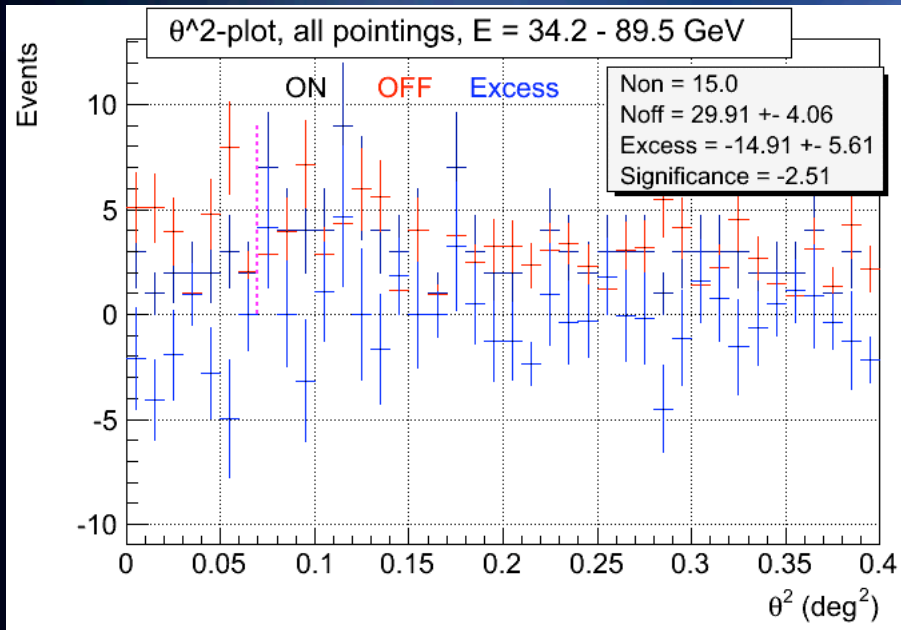


1ES0229+200

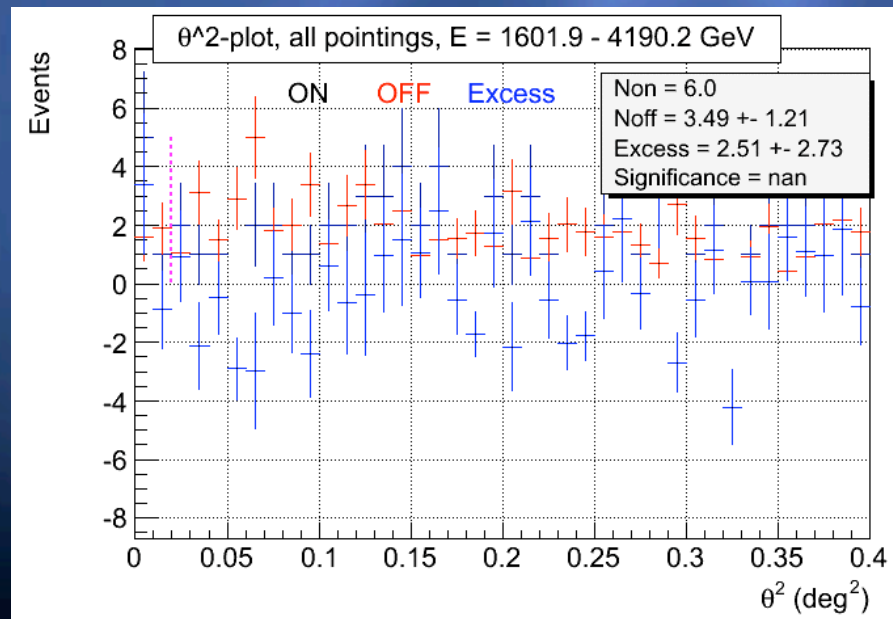
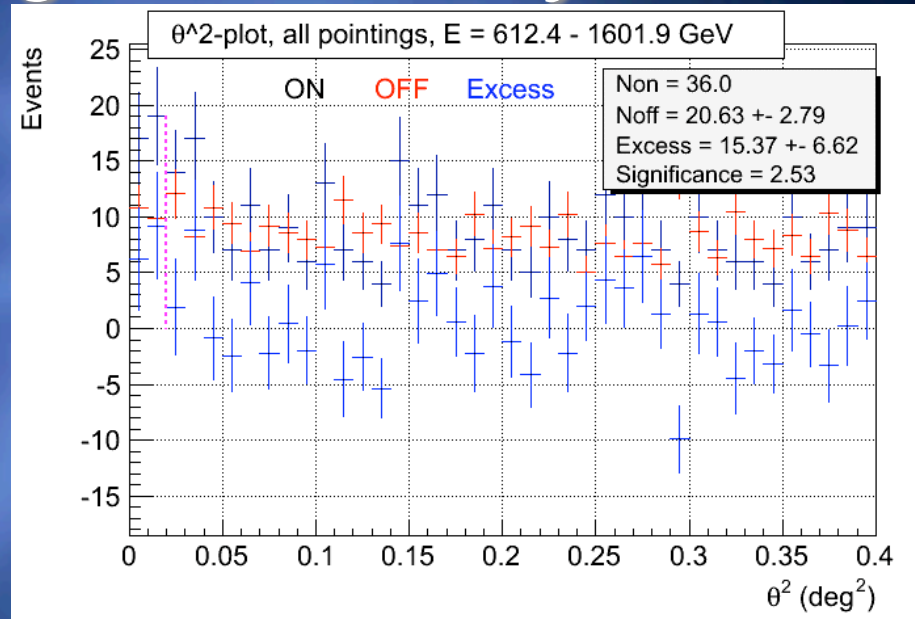
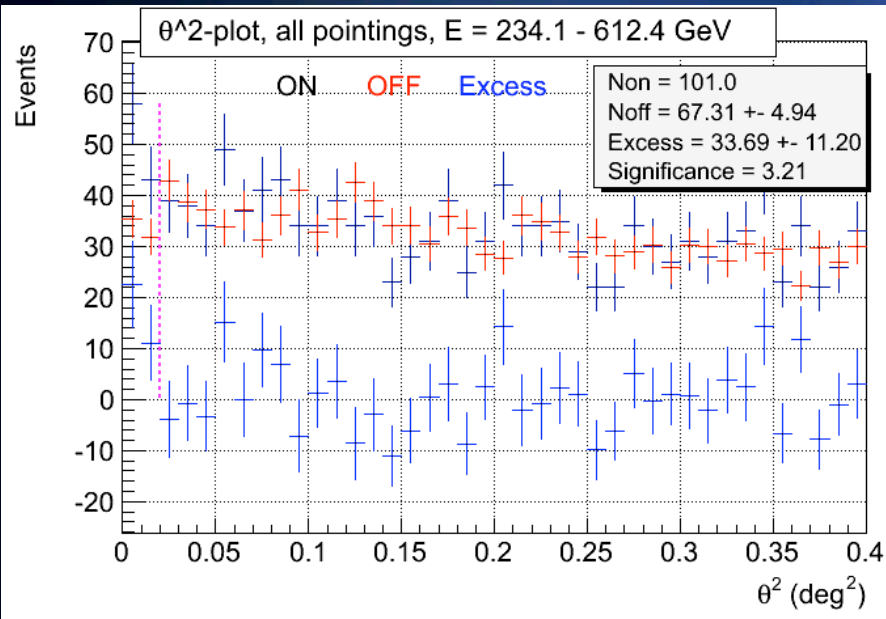


- ⊕ After data selection: 6.64 h
- ⊕ HESS spectrum (blue line), power law with $\Gamma = 2.50 \pm 0.19_{\text{stat}} \pm 0.10_{\text{syst}}$

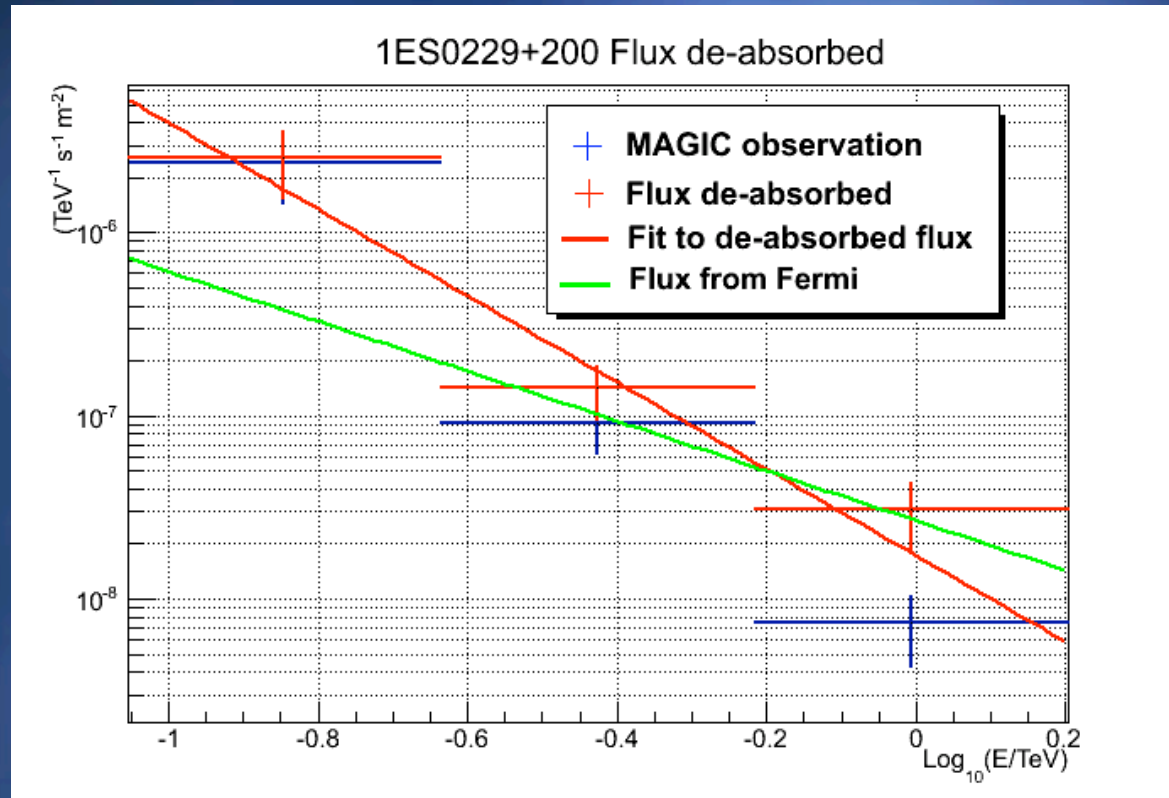
1ES0229+200: Significance by bin



1ES0229+200: Significance by bin



1ES0229+200: Flux de-absorbed

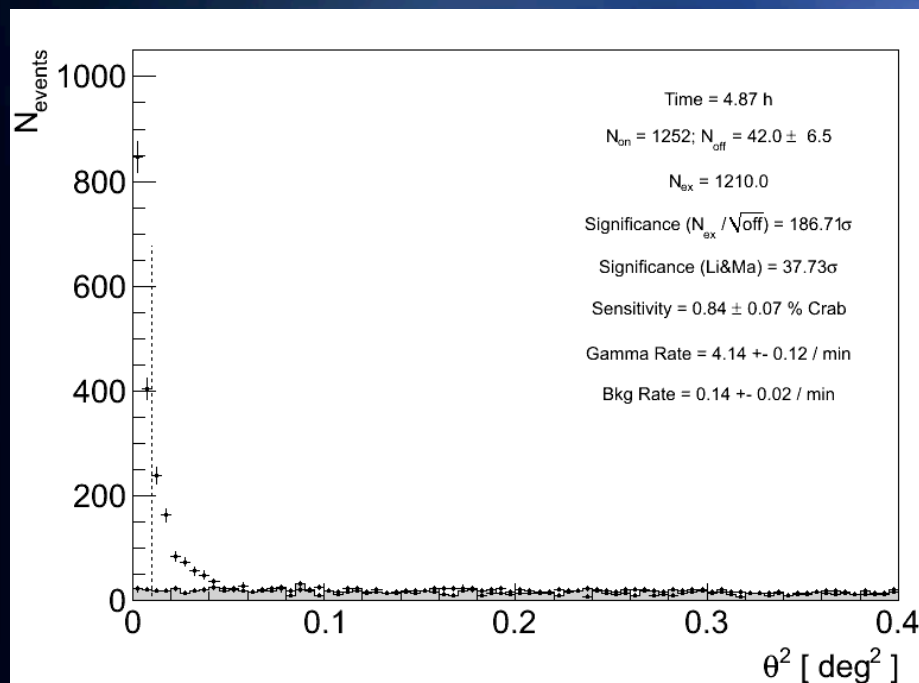


- ⊕ Fit to the de-absorbed flux with a power law with $\Gamma = 2.36 \pm 0.77$ (red line)
- ⊕ Fermi spectrum (green line), power law with $\Gamma = 1.36$

1ES0229: Paolo Da Vela analysis

- ⊕ MARS version 2.10.3
- ⊕ Data from 2013_01_08 excluded of the analysis because of the low rate
- ⊕ MC from the “March_Settings”
- ⊕ RF, disp1, disp2 and Energy Tables using NGC1275 and SegueA as off region

1ES0229: Paolo Da Vela analysis

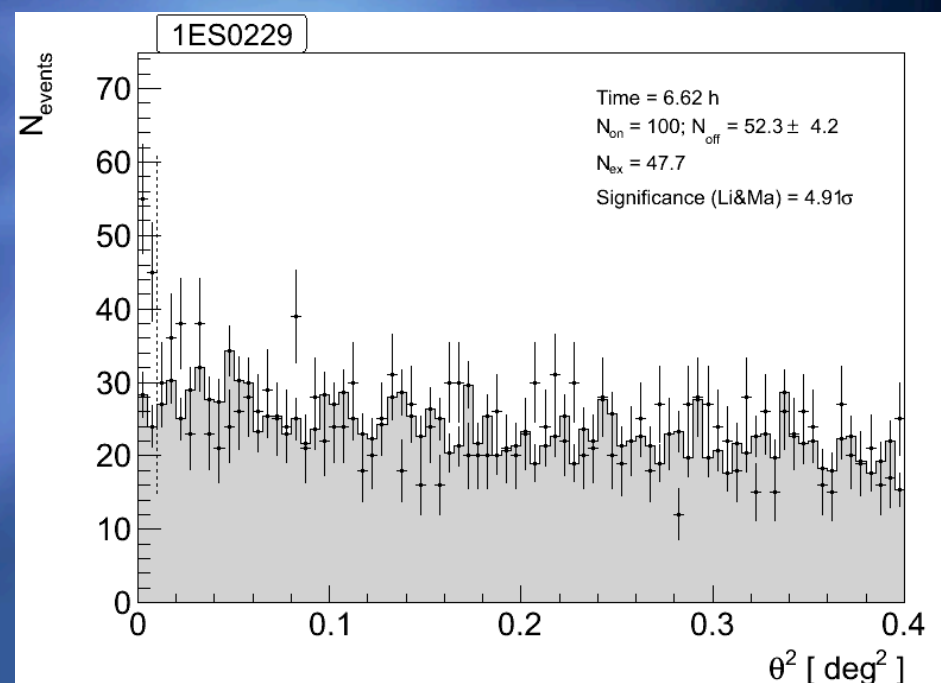


Time: 4.87 h

$N_{\text{on}} = 1252$; $N_{\text{off}} = 42.0$

Significance (Li & Ma): 37.73σ

Sensitivity = 0.84 ± 0.07 % Crab



Time: 6.62 h

$N_{\text{on}} = 100$; $N_{\text{off}} = 52.3$

Significance (Li & Ma): 4.91σ