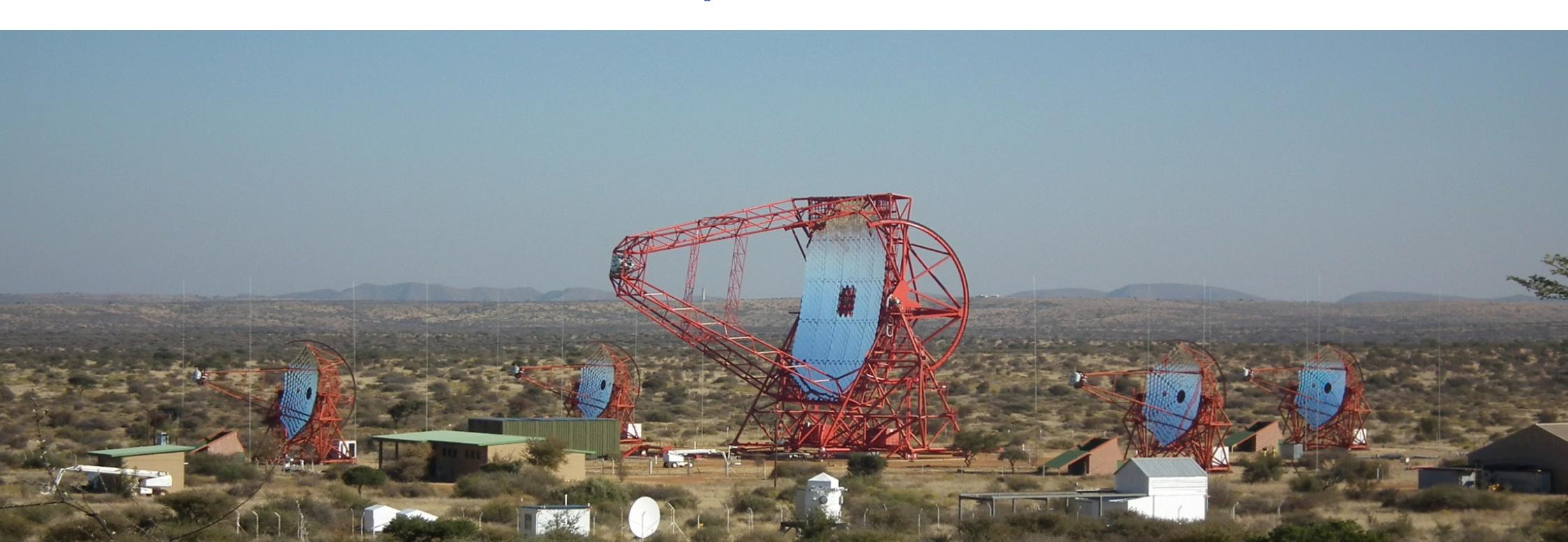


Highlights from H.E.S.S.

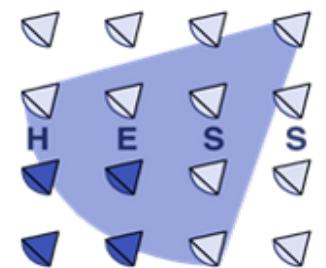
News from the Southern Hemisphere



• Universität
• Potsdam
•



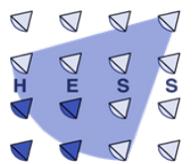
Christian Stegmann
University Potsdam, DESY
Gamma 2012



The H.E.S.S. collaboration



MPI Kernphysik, Heidelberg, Humboldt Univ. zu Berlin, Ruhr-Univ. Bochum, Univ. Erlangen-Nürnberg, Univ. Hamburg, LSW Heidelberg, Univ. Potsdam, Univ. Tübingen,
Ecole Polytechnique, Palaiseau, APC Paris, Univ. Paris VI-VII Paris, Univ. Bordeaux, Observatory, Meudon,
LAPP Annecy, LAOG Grenoble, LPTA Montpellier, CEA Saclay, CESR Toulouse,
Durham Univ., Univ. Leicester, Dublin Inst. for Adv. Studies,
Polish Academy of Sciences, Warsaw Jagiellonian Univ., Cracow Charles Univ., Prague, Yerevan Physics Inst.
Univ. Adelaide, North-West Univ. Potchefstroom, Univ. of Namibia, Windhoek



The H.E.S.S. I system currently operating



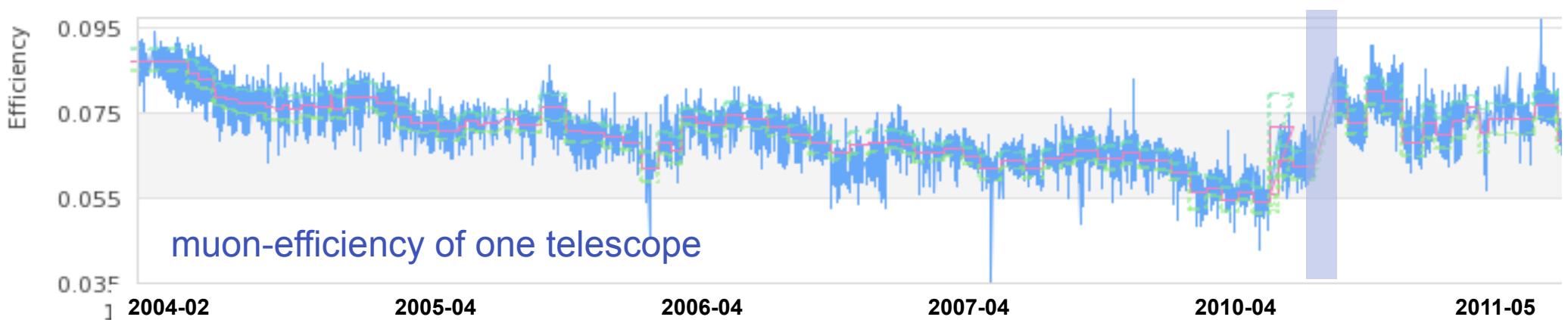
- > 4 telescope system in Namibia
- > energy threshold ~200 GeV
- > mirror diameter 13m
- > energy resolution ~15%
- > mirror area 107 m²
- > field of view 5°
- > angular resolution ~0.1°



System status

> Mirror re-coating

- From 4/2010 to 10/2011, every 6 months one telescope (time needed for recoating of old mirrors)
- efficiency almost recovered (Winston-cones, aging of PMTs, ...)



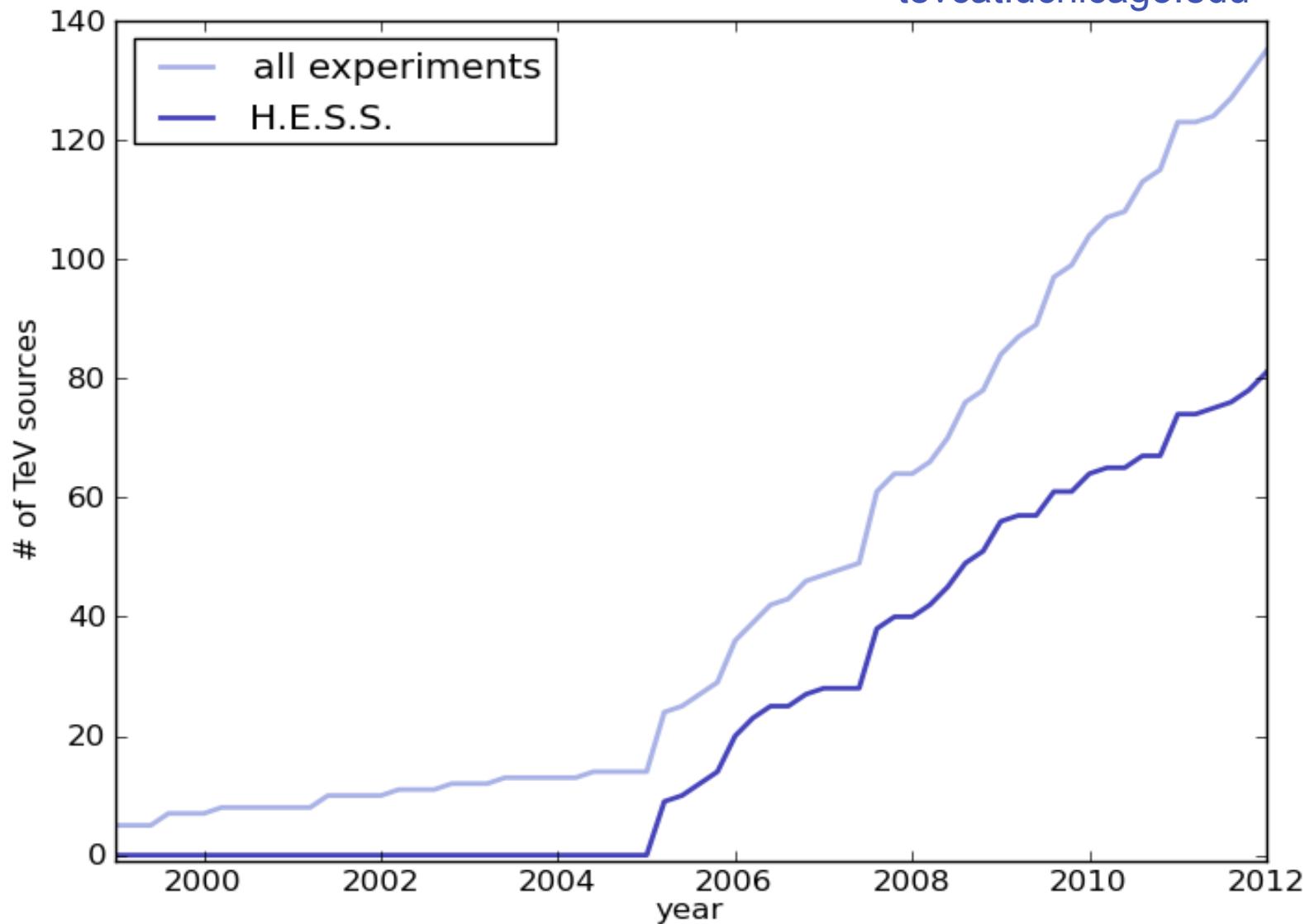
> Improved analysis techniques → up to a factor of 2 improvement in flux sensitivity, see e.g.:

- de Naurois et al APh 32, 231 (2009), Ohm et al APh 31, 383 (2009), Fiasson et al APh 34, 25 (2010), Becherini et al APh 34, 858 (2011)



Source count

tevcat.uchicago.edu

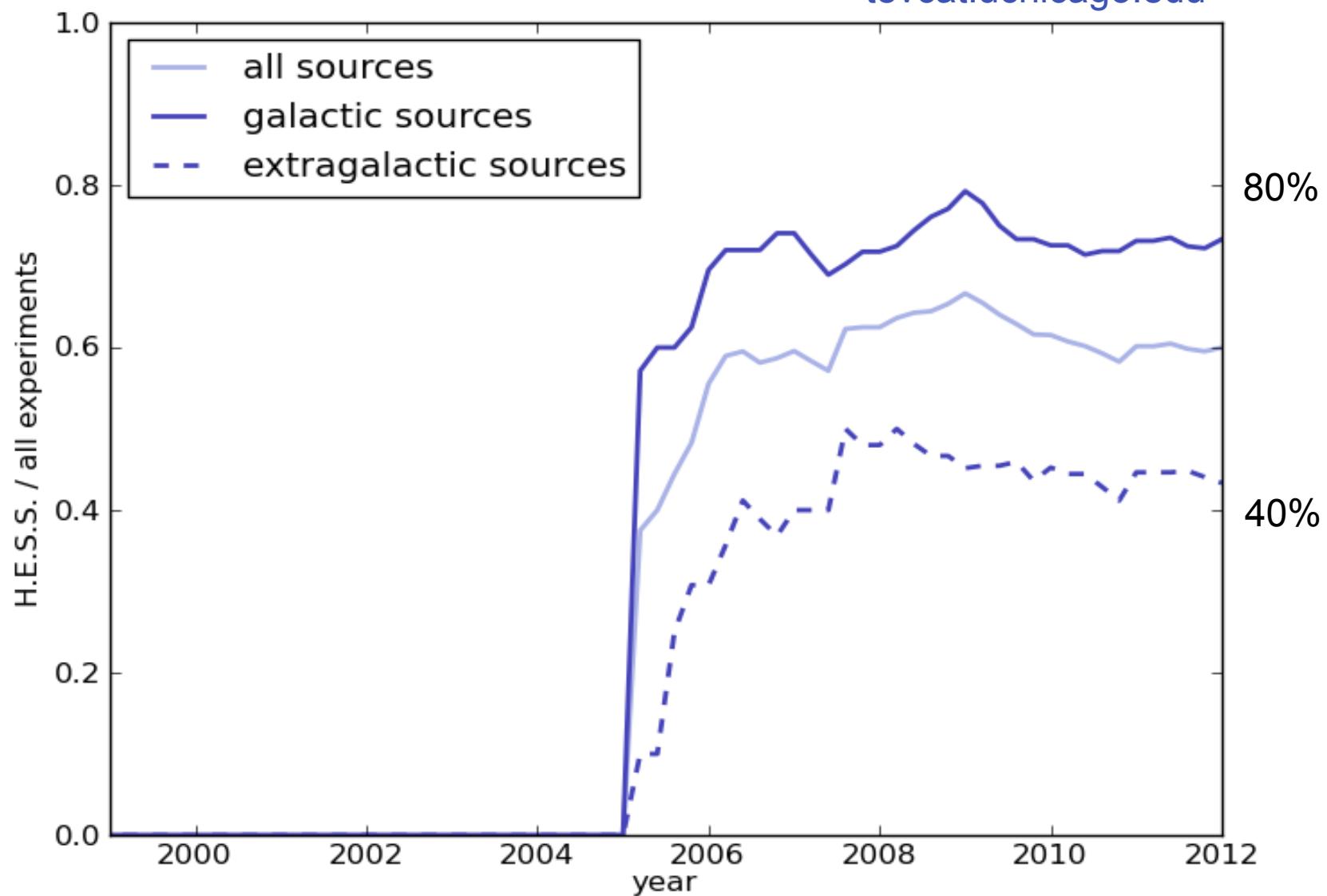


All: Whipple, Crimea, Telescope Array, Durham, MAGIC, VERITAS, H.E.S.S.



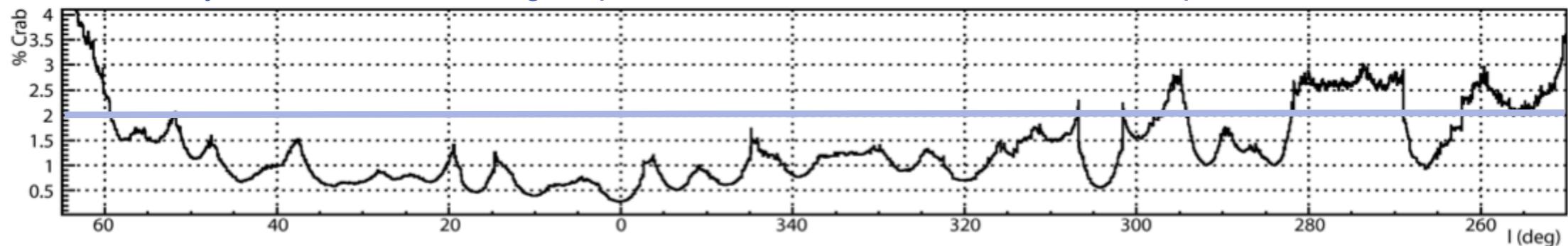
H.E.S.S. contribution

tevcat.uchicago.edu



The H.E.S.S. Galactic Plane Scan

Sensitivity at $b=-0.3^\circ$, assuming a spectral index of 2.5, detection level 5σ pre-trials



> 2300 hours of good-quality data

- scan + pointed observation

> Focus

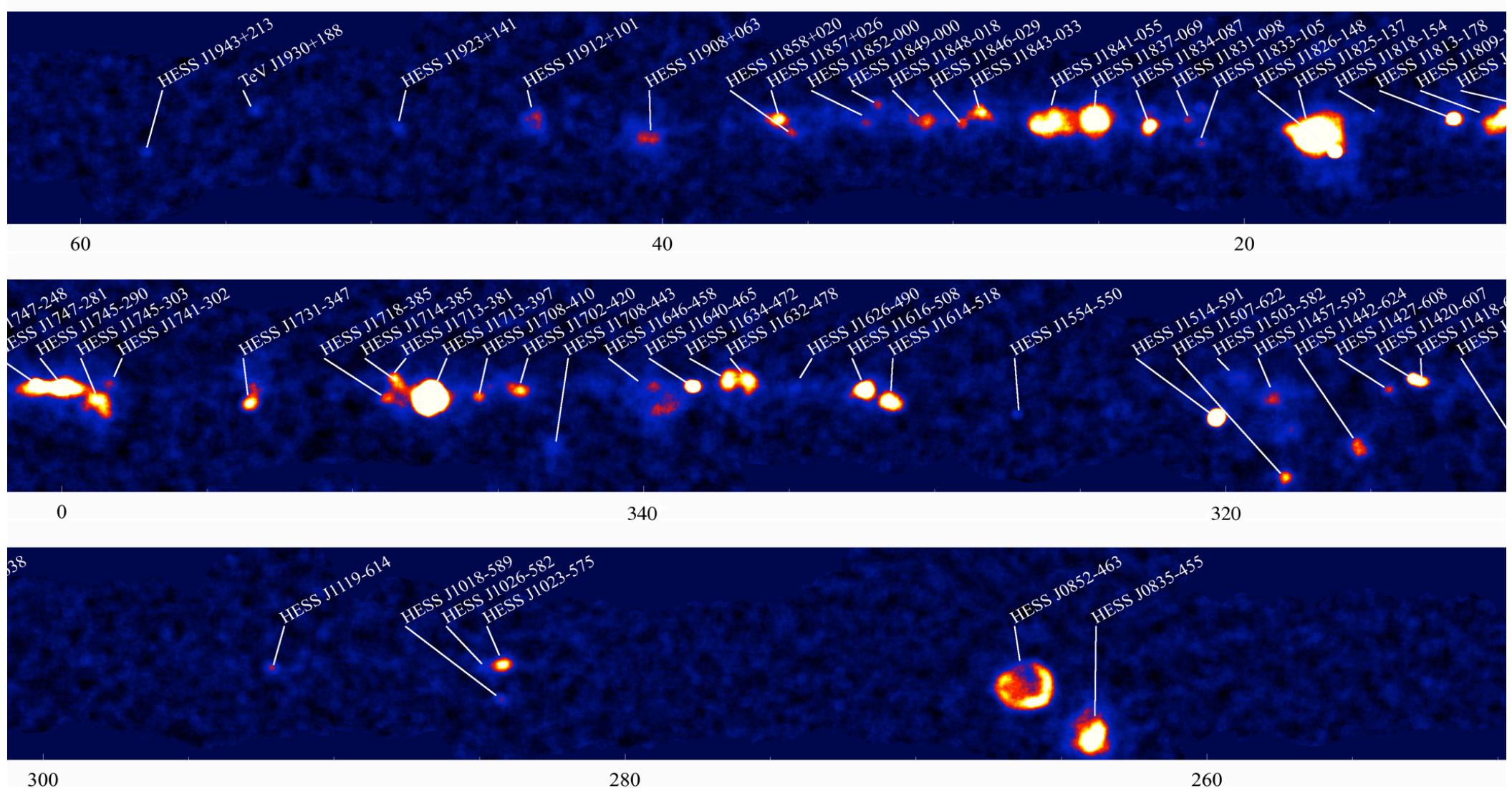
- reach 2% Crab for core region ($60^\circ < l < 282^\circ$)
- deepening exposure for $268^\circ < l < 282^\circ$

> Population

- SNR, PWN, unidentified sources, binaries, one extreme BL Lac, open star cluster, globular cluster, ...



The Milky Way seen with H.E.S.S.



An incomplete list of recent results

- > HESS J1457-593 and HESS J1852-000
 - potential interaction of cosmic-rays accelerated in an SNR with spatially coincident molecular clouds.
- > emission from the direction of PSR J1459-6053
 - a candidate Pulsar Wind Nebula driven by a rather old (64 kyr) gamma-ray pulsar.
- > HESS J1554-550
 - in the direction of the composite SNR G327.1-1.1: SNR shell and central PWN seen in radio and X-rays.
- > HESS J1747-248
 - in the direction of the globular cluster Terzan 5: large population of ms pulsars, very large stellar core density, bright flux in GeV;
- > HESS J1818-154
 - coincident with shell-type SNR G15.4+0.1. VHE gamma-ray emission significantly less extended than radio shell.
- > HESS J1831-098
 - likely associated with PSR J1831-0952, a 67 ms pulsar, less than 1% of spin-down energy required to power VHE emission in PWN scenario.
- > ...



Gamma 2012 contributions

> Galactic sources

- Discovery of emission towards the magnetar SGR1806-20 and stellar cluster C1 1806-20
- Observation of Eta Carina and the Carina Nebula
- Observation of PSR B1259-63/LS 2883
- Observation of HESS J0632-057

Gavin Rowell
Stefan Ohm
Iurii Sushch
Pol Bordas

> Extragalactic sources

- Discovery of the blazar 1ES 1312-423
- Discovery of PKS 0301-243
- Discovery of the most distant BL Lac at VHE
- Discovery of BL Lac SHBL J001355.9-185406
- The EBL imprint on H.E.S.S. blazar spectra

Jonathan Biteau
Denis Wouters
Yvonne Becherini
David Sanchez
Jonathan Biteau

> Astroparticle

- Search for photon line-like signatures from Dark Matter annihilations

Christopher van Eldik

> Instrument

- Long term data quality selection under challenging atmospheric conditions
- Performance of HESS-II in multi-telescope mode with a multi-variate analysis

Joachim Hahn

Yvonne Becherini



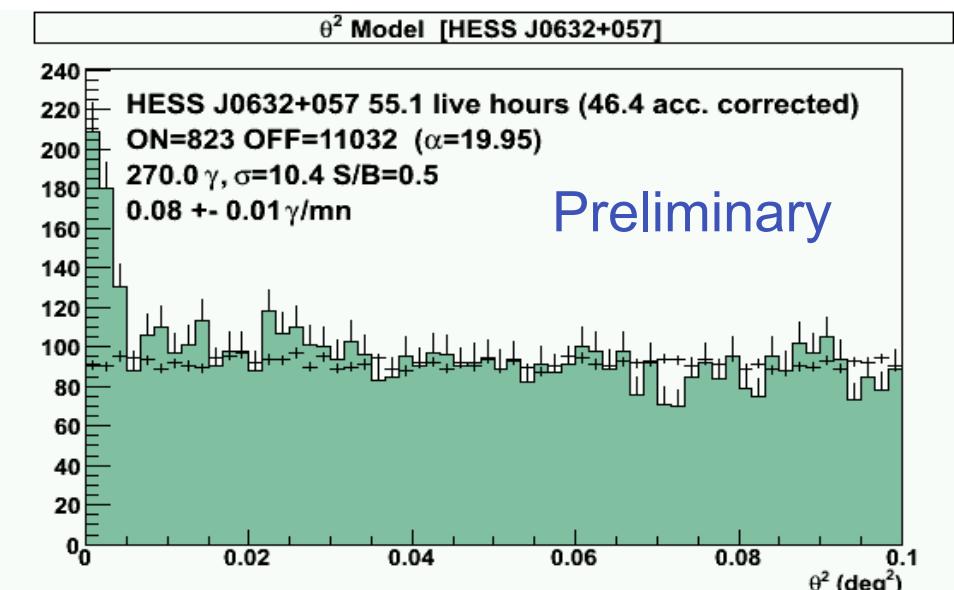
HESS J0632+057

H.E.S.S., arXiv:0704.0171
Hinton et al., arXiv:0809.0584
VERITAS, arXiv:0905.3139, ATEL 3153
MAGIC, ATEL 3161

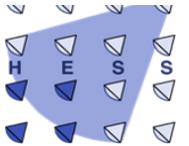
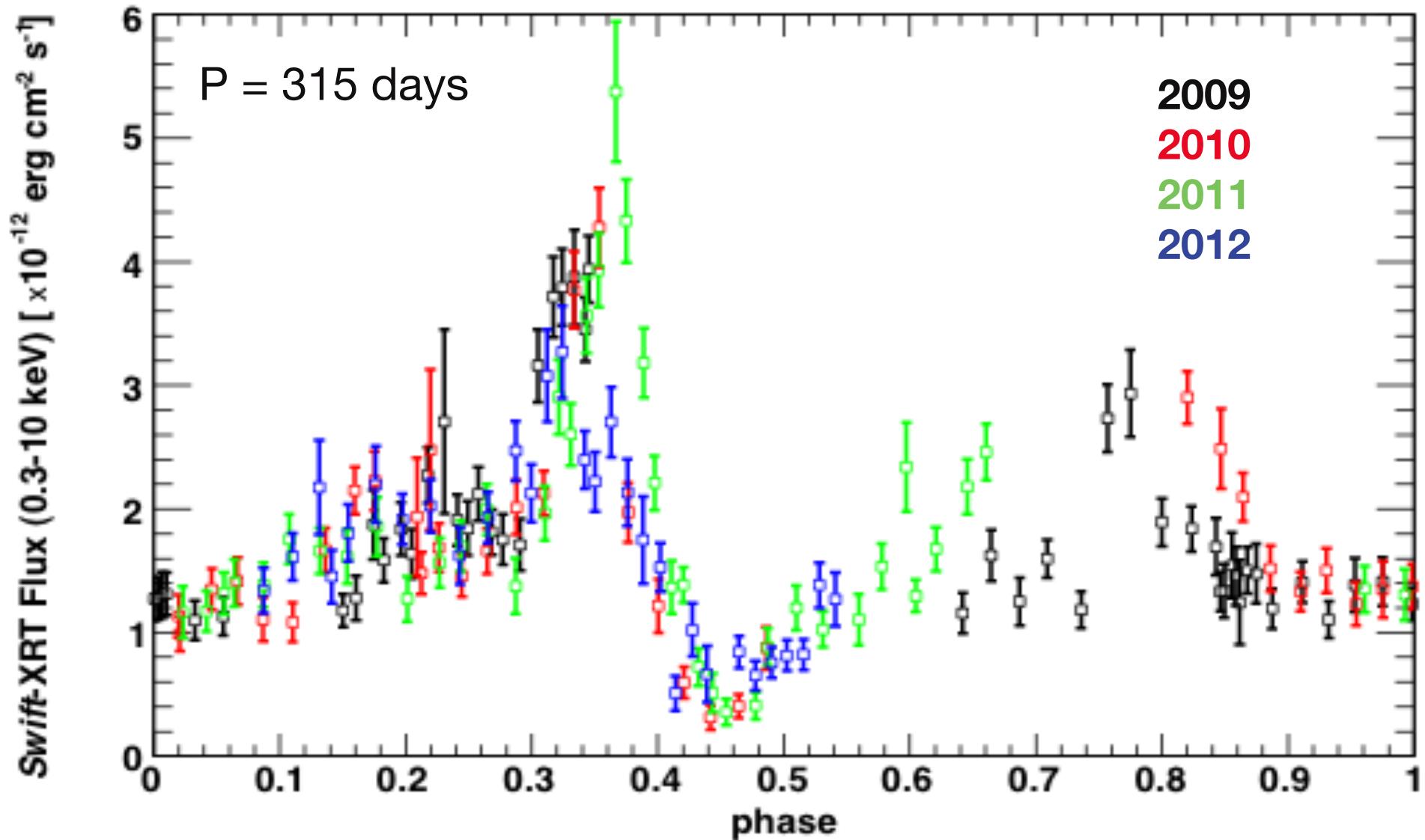
© Adam Block, Tim Puckett

- First binary detected in VHE gamma-rays
- Data from 2004 to 2012
- Total data set ~55 h

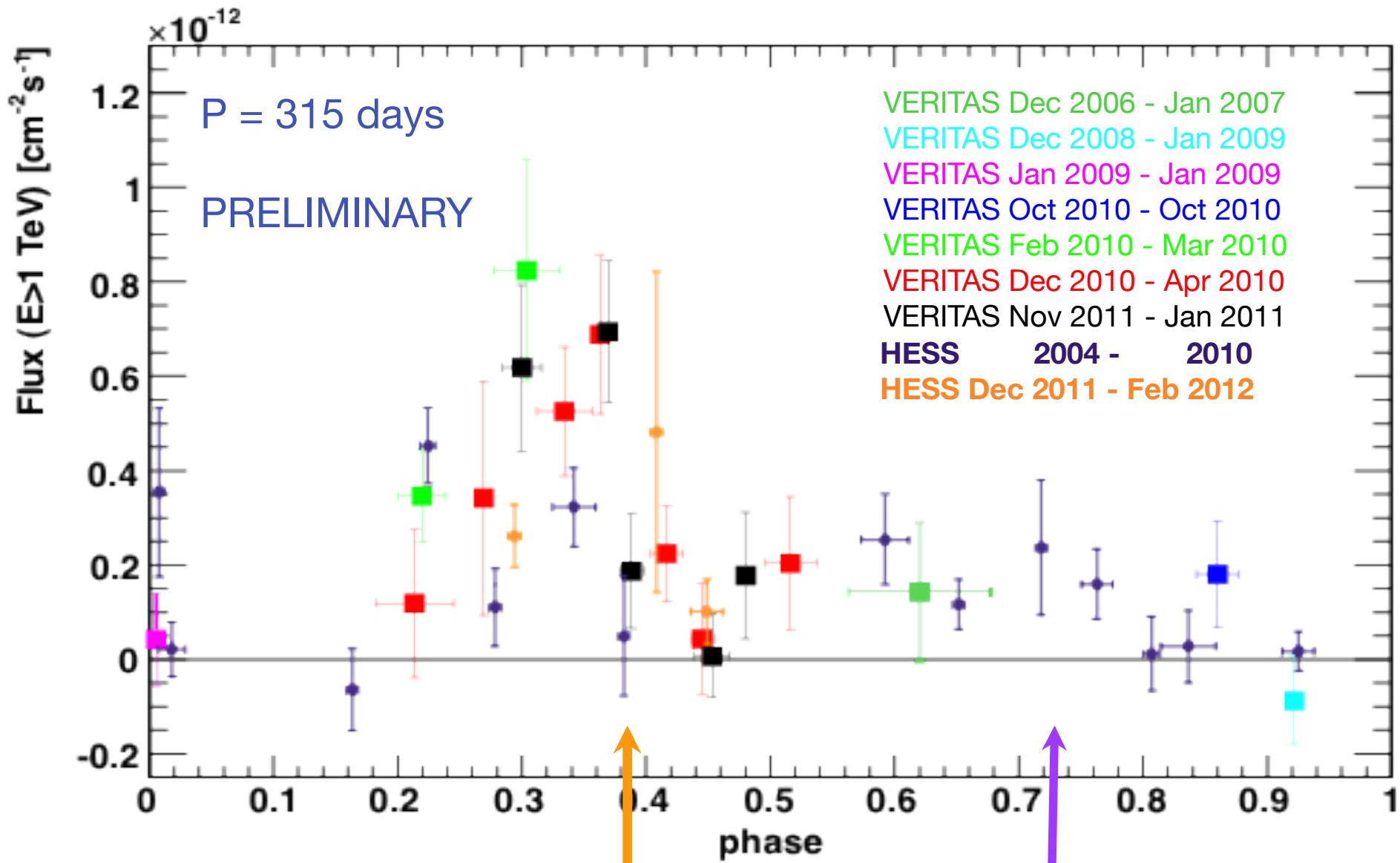
MWC 148



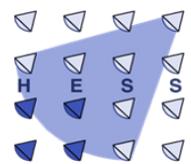
Phasogramm from Swift



VERITAS/H.E.S.S. observations of HESS J0632+057



Poster by Pol Bordas



The extra-galactic sky

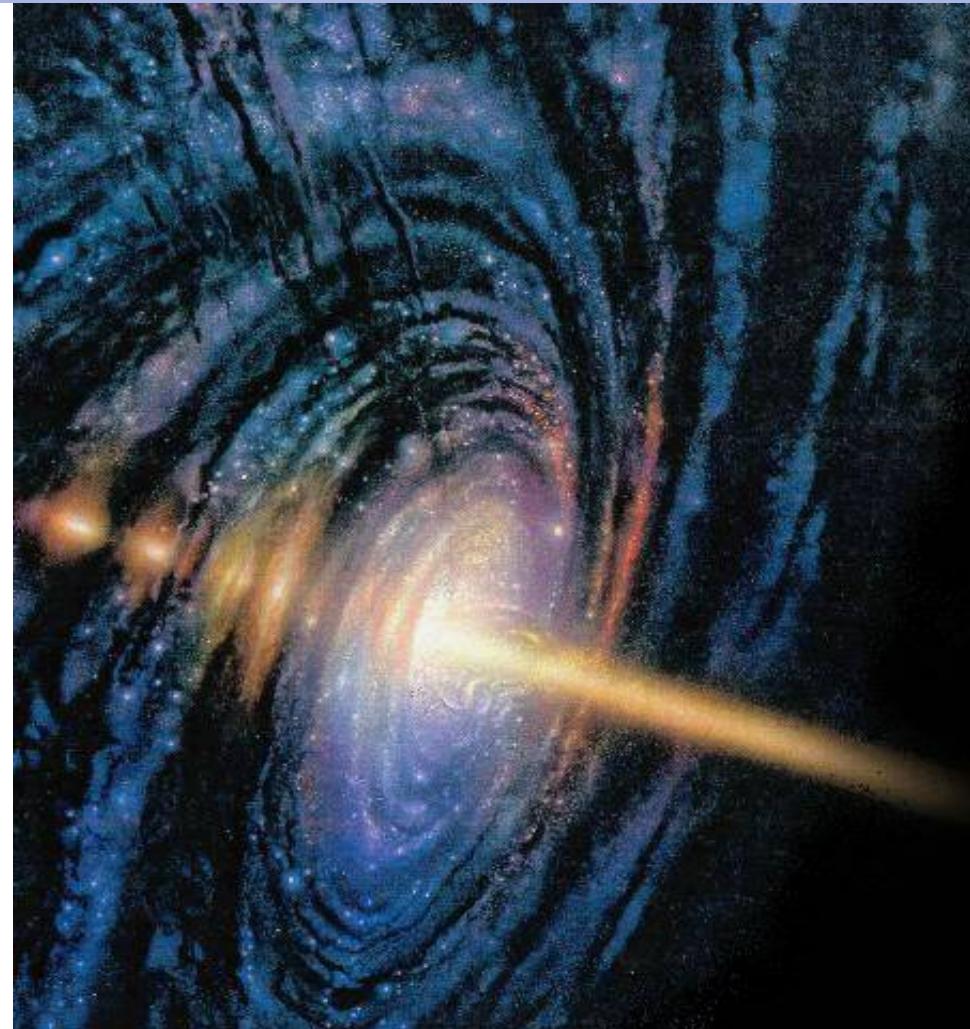
- > AGN studies and EBL
- > Extended extra-galactic objects
- > AGN monitoring
 - increase statistics of the bright sources and flares
- > AGN searches
 - increase the number of sources
 - New discoveries @ Gamma2012

1ES 1312-423

PKS 0301-243

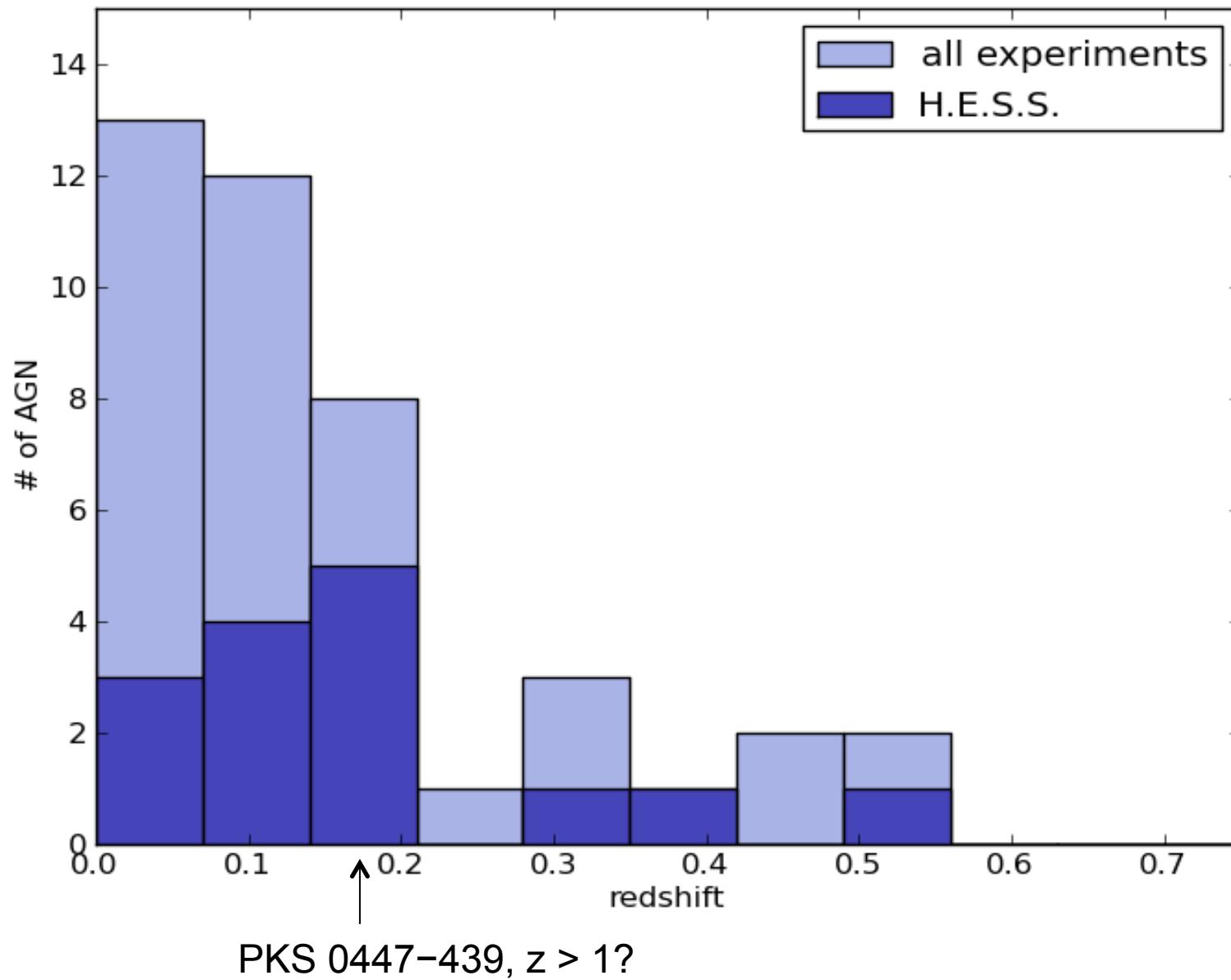
SHBL J001355.9-185406

A distant BL Lac at VHE

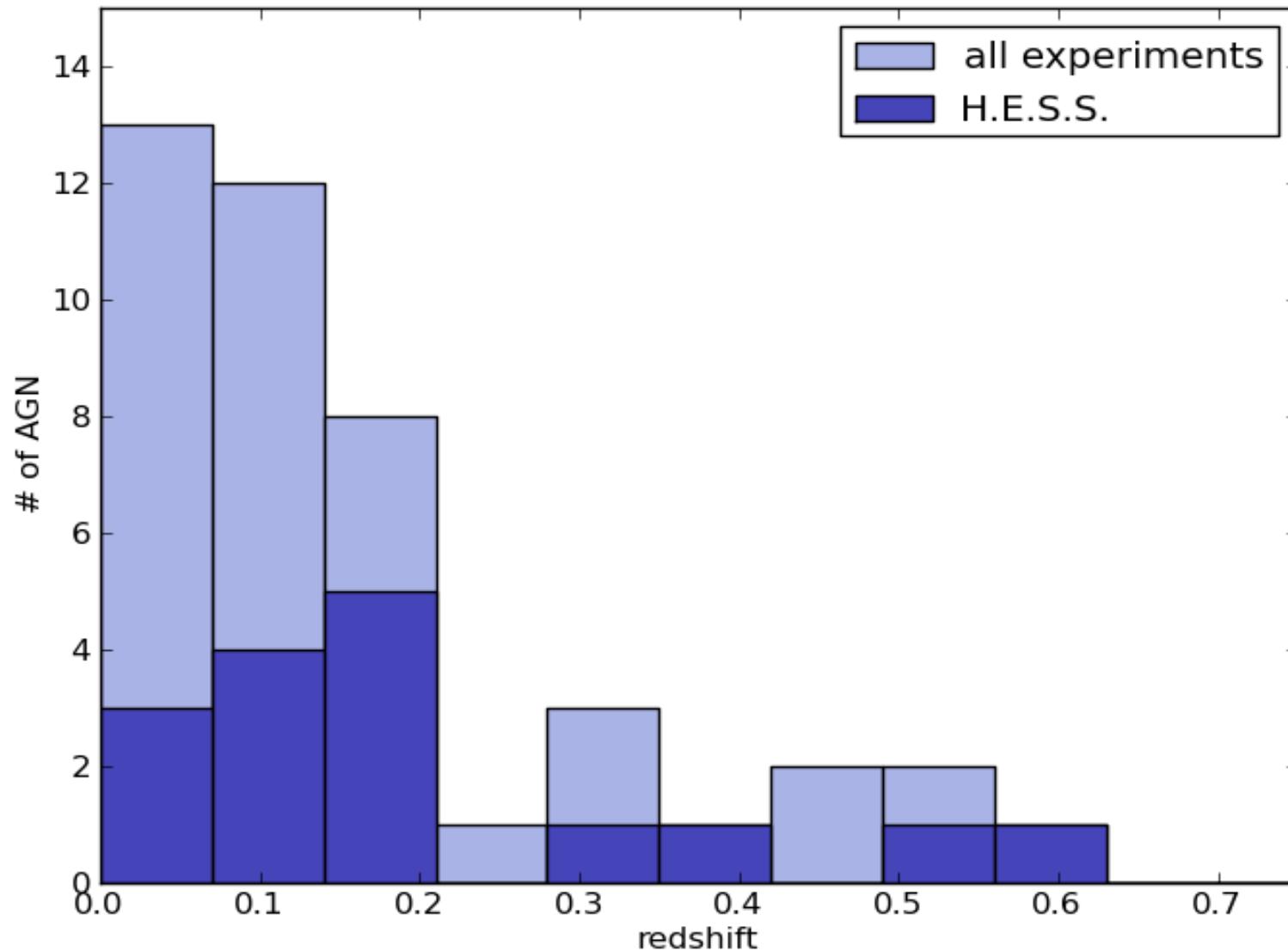


The AGN source count

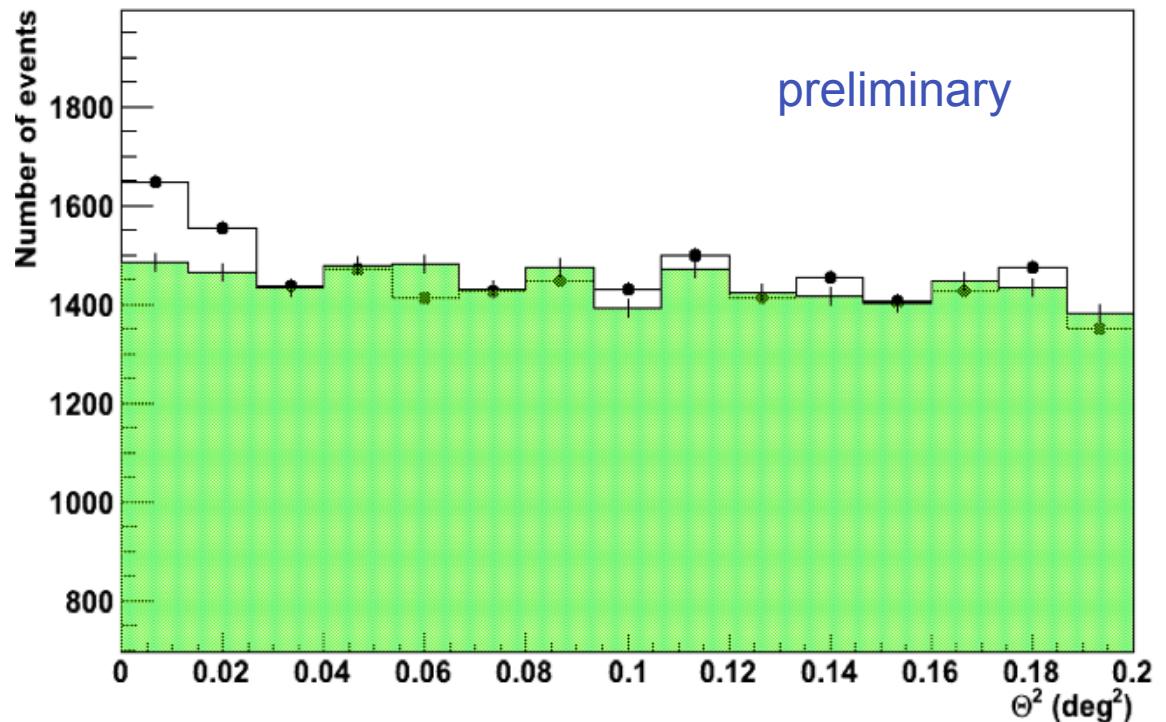
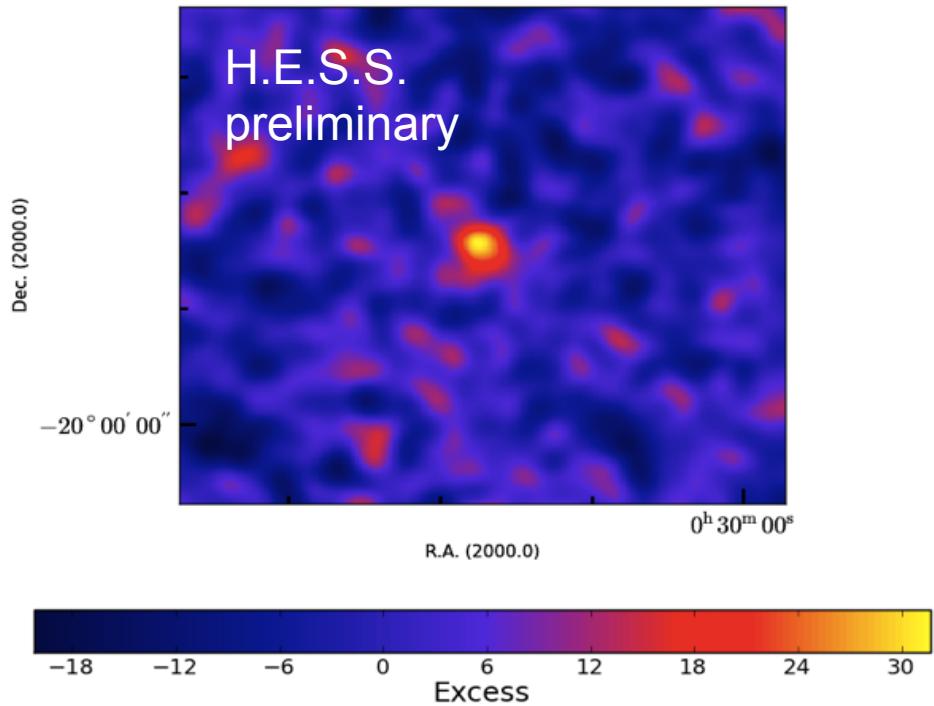
tevcat.uchicago.edu



The AGN source count



Discovery of KUV 00311-1938

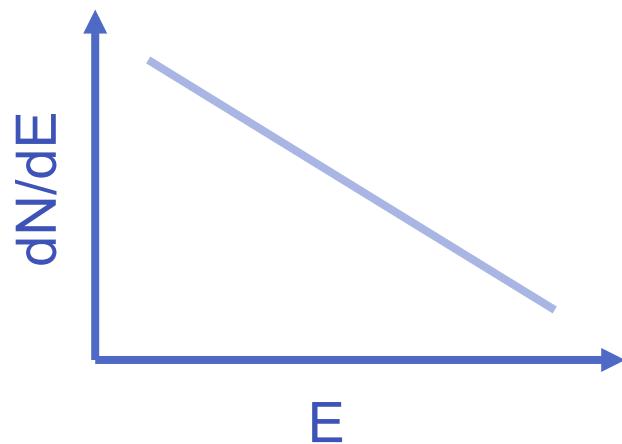
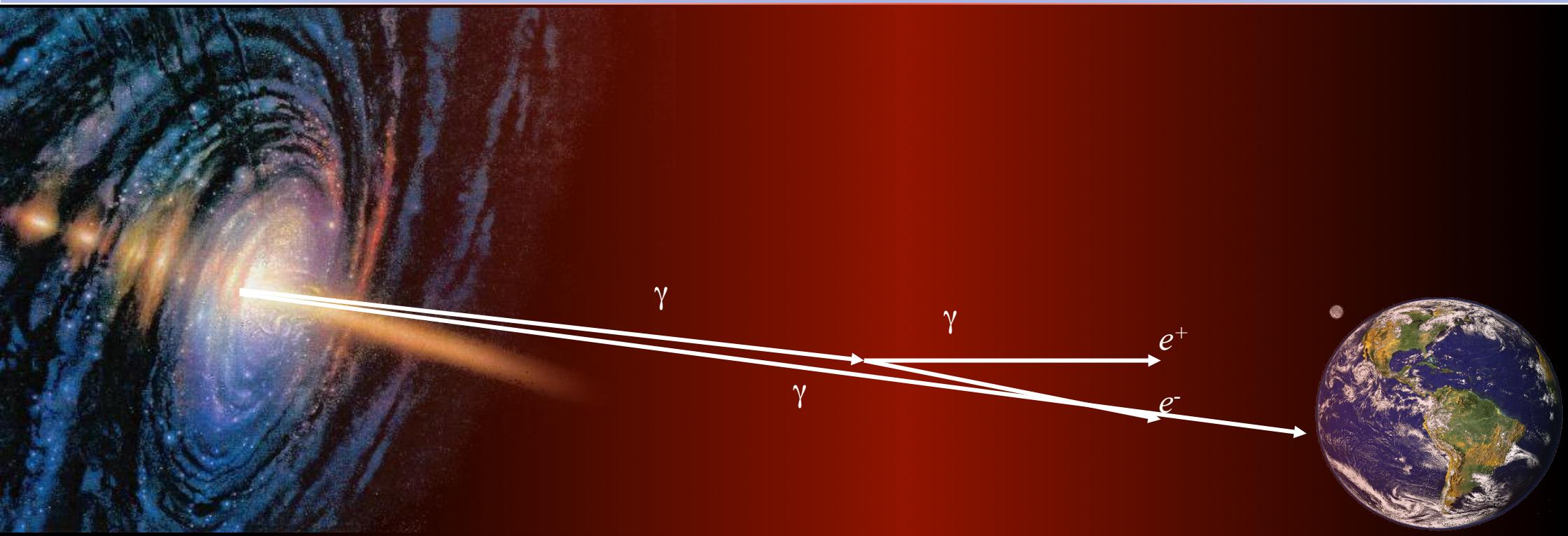


- Very distant blazar ($z \sim 0.61$)
- H.E.S.S. observations
 - 52.5 h of good-quality data
 - 5.1σ (152 excess events)

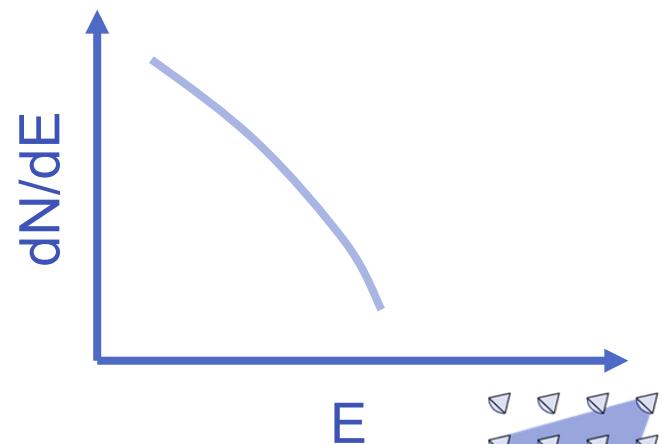
➤ Poster by Yvonne Becherini



Extra-galactic background light

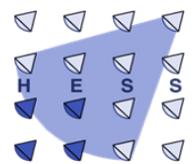
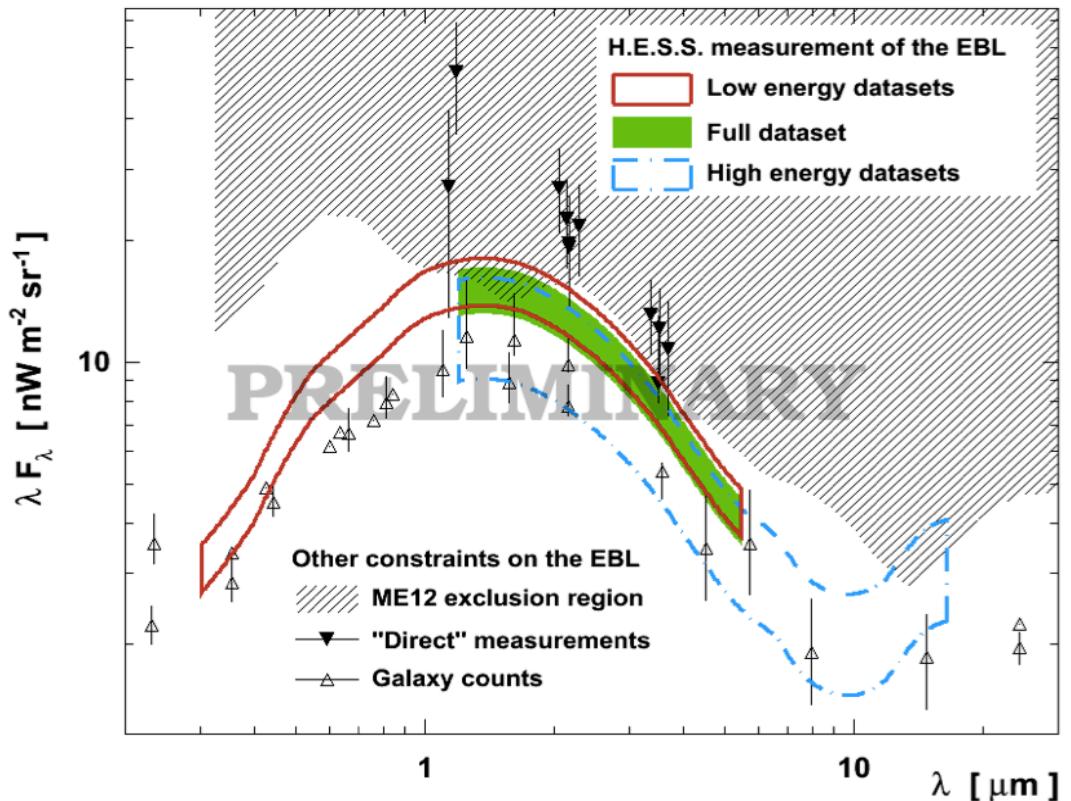


Absorption in extragalactic
background light (Infrared)



The EBL imprint

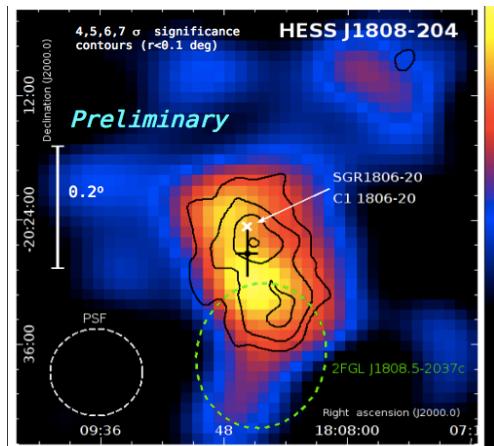
- > Allow for intrinsic source spectra with curvature
- > Parametrization of the EBL optical depth via a scaling factor α
- > Fit of a large VHE data set
 - 75 000 γ -rays from the seven brightest blazars
 - Distance $0.03 < z < 0.19$,
 - 400 hours of observation with H.E.S.S.
- > Talk by Jonathan Biteau



Off the beaten tracks

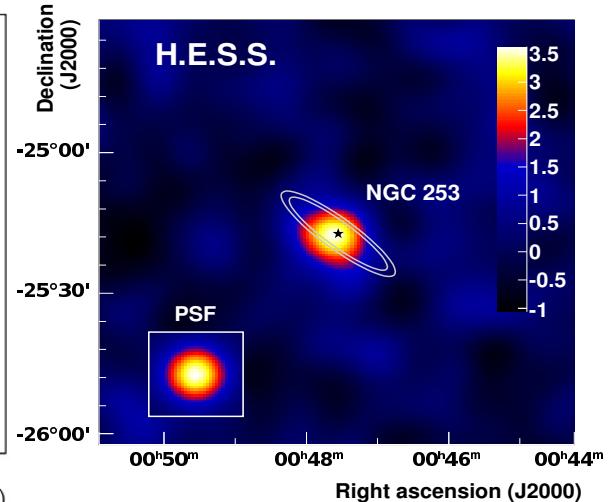
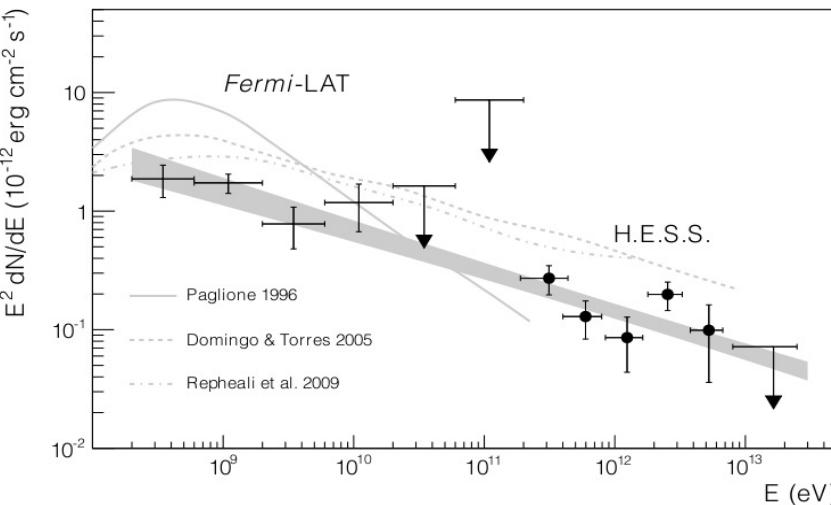
HESS J1808-204

Magnetar or stellar cluster?

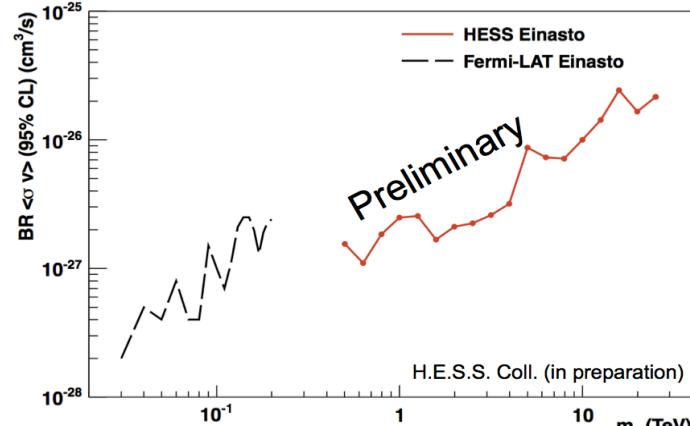


Talk by Gavin Rowell

NGC 253 spectrum

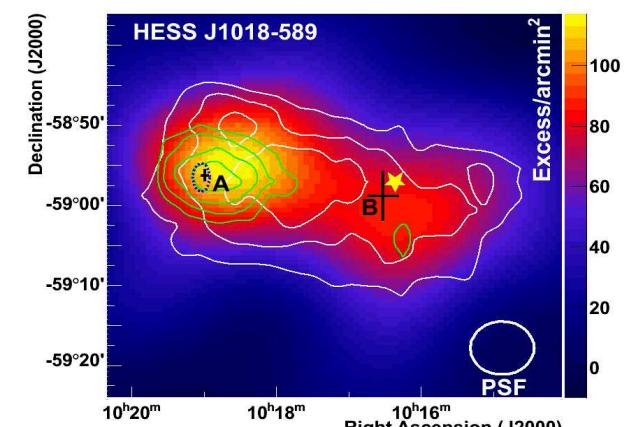
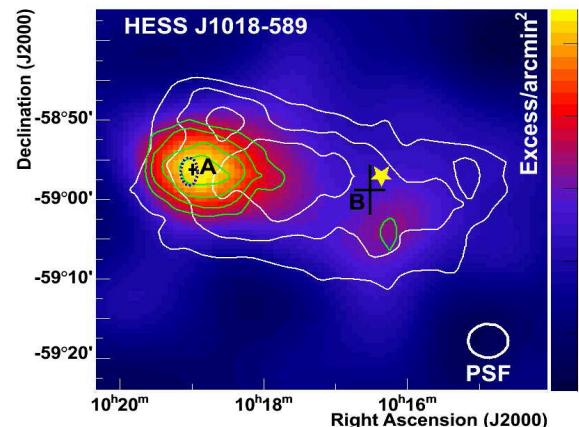


Dark matter line search



Talk by Christopher v. Eldik

HESS J1018-589 – a new TeV binary?



The near Future: H.E.S.S. II



H.E.S.S. II

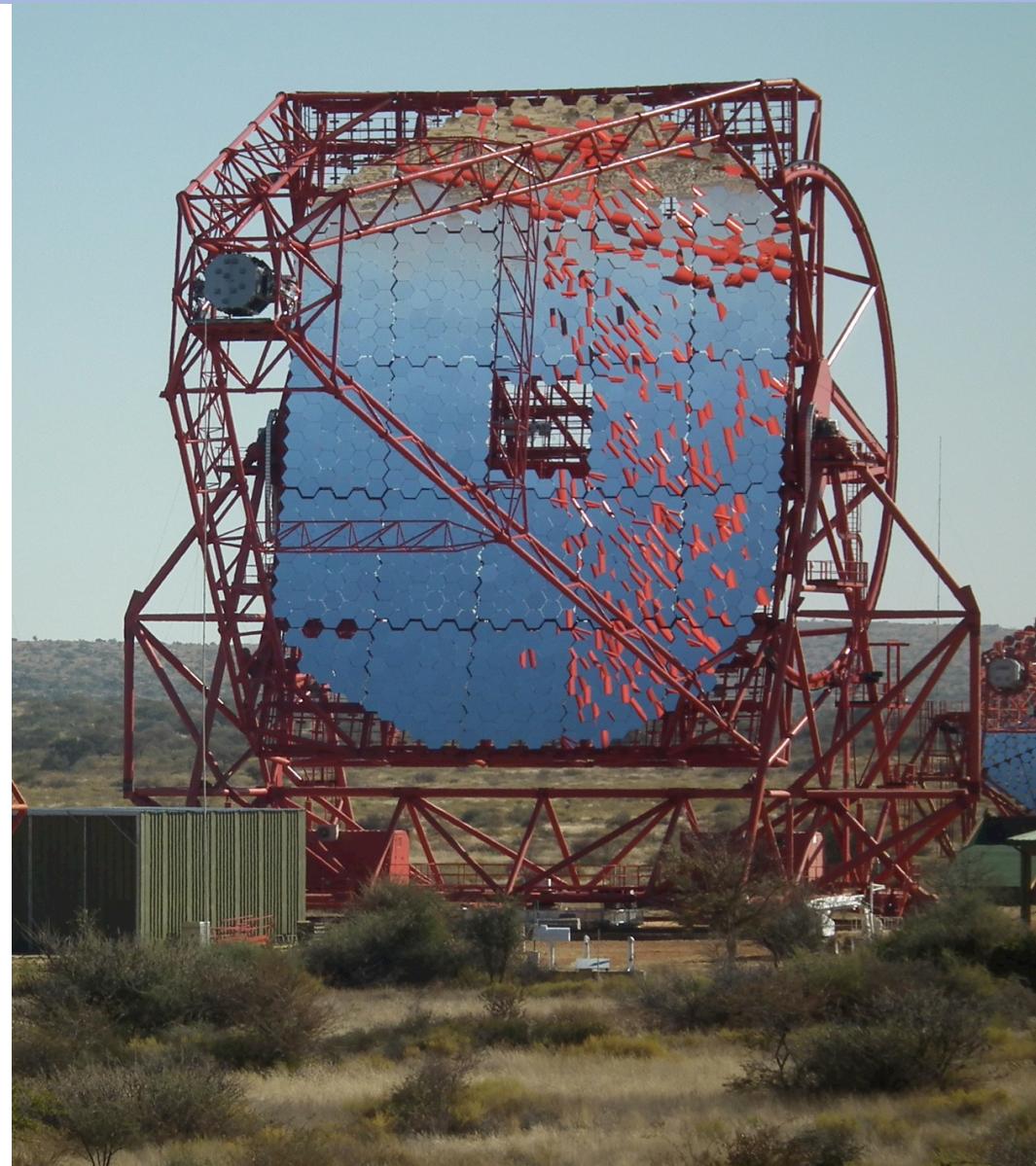
> Status

- All components installed
- Tracking test ready
- Mirror alignment ongoing
- Camera commissioning started
- DAQ integration ongoing
- ...

> First events this week...

> Why?

- increased sensitivity
- lower threshold
- fast pointing
- hybrid system



H.E.S.S. II

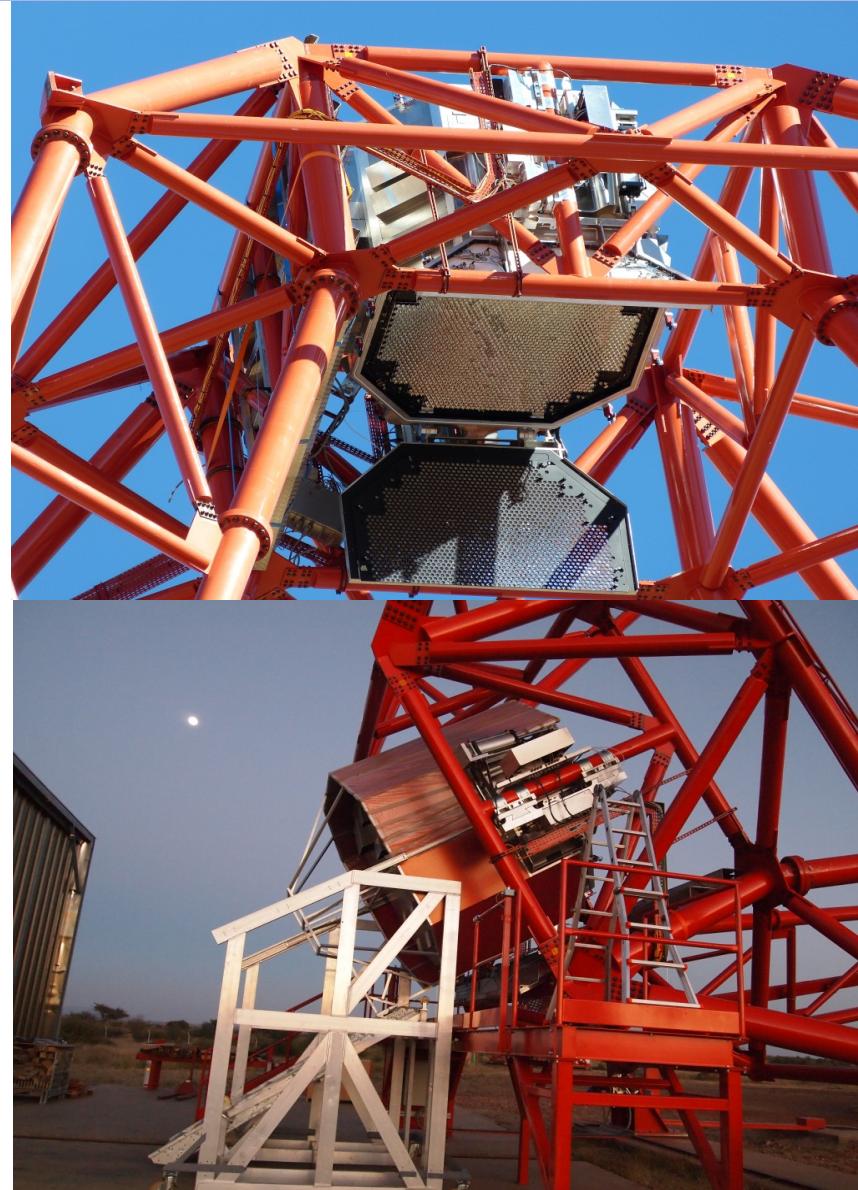
> Why?

- increased sensitivity
- lower threshold
- fast pointing
- hybrid system

> Status

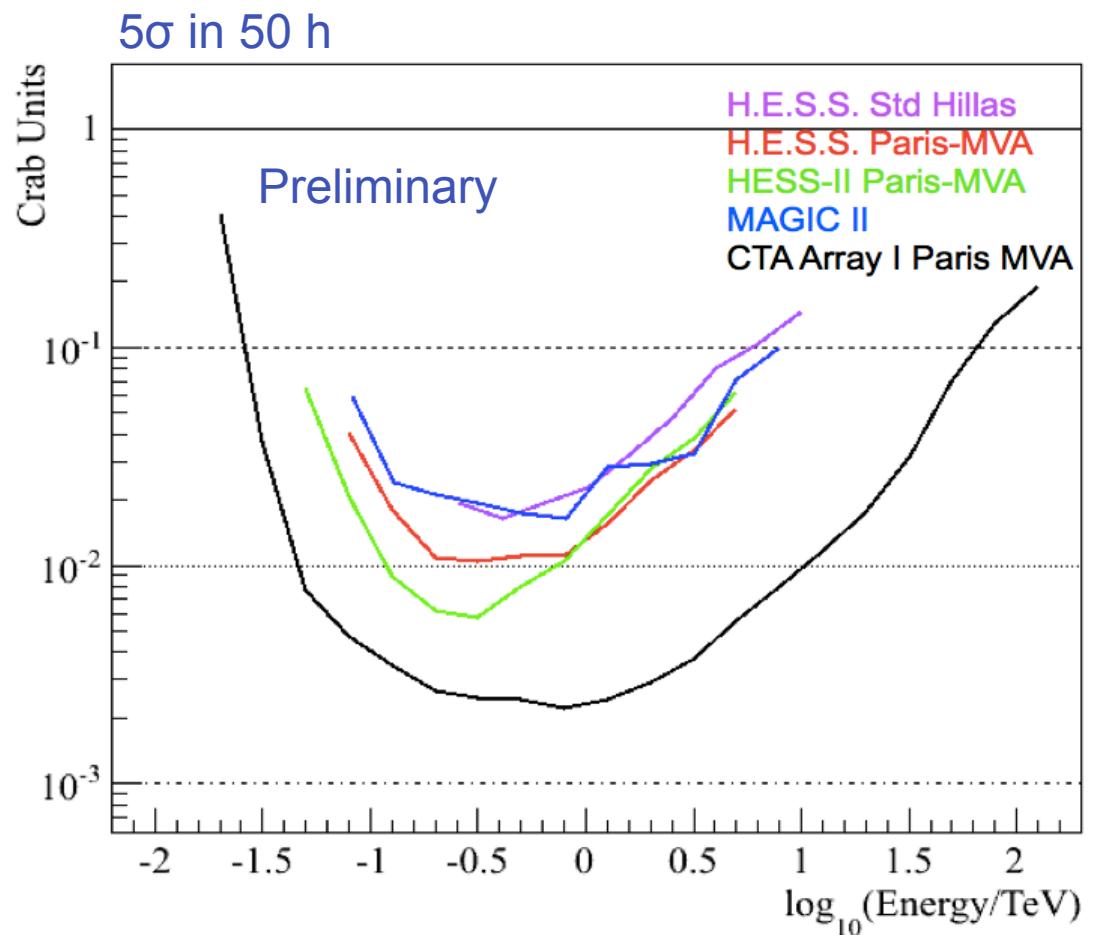
- All components installed
- Tracking test ready
- Mirror alignment ongoing
- Camera commissioning started
- DAQ integration ongoing
- ...

> First events this week...



H.E.S.S. II Performance

- H.E.S.S. I reconstruction schemes are being adapted
- Paris MVA-hybrid reconstruction
 - energy threshold 50 GeV
 - energy resolution 15%
 - angular resolution 0.1°
 - not fully optimized yet
- Poster by Yvonne Becherini



Summary



- > H.E.S.S. continues to contribute to our understanding of the high-energy Universe

