General Remarks
- Contribution Statistics
- The VHE instruments
- HE Contributions
OG 2.1-2.2 Diffuse Emission and Galactic Sources
OG 2.4: GRBs
OG 2.3: Extragalactic Sources
Conclusions
Contribution Statistics

By Section
- OG 2.1: 8, OG 2.2: 86, OG 2.3: 58, OG 2.4: 24

By Author
- GLAST LAT collaboration: 7
- From VHE collaborations: 123 –
- Small groups (mostly theoretical work): 45

By Topic
- AGN: 45, Binaries: 11, Diffuse: 9, Galactic Centre: 6, Galaxy Clusters: 4, GRBs: 22, Pulsars: 7, PWN: 17, SNR: 17, Surveys: 9, Unidentified Sources: 11, Misc: 17

Usual Apology
- No time to present all 175 papers, highlights only (98!)
- Bias towards experiment results
A truly global effort!
VERITAS is complete!
- First light (full array) April 2007
- Sensitivity similar to H.E.S.S.

Detections presented on
- IC 443, LS I +61 303, M 87, 1ES 1218+304, Mrk 421, Mrk 501

Survey of the Cygnus region underway
- Expect exciting results rather soon!
Southern Hemisphere VHE Sources

For the last few years there have been systematic differences between southern hemisphere instruments – these have now been resolved:

Additionally – HESS J1303 and J1804 C-III results presented here – consistent spectra

---

Table 1: Summary of TeV source status claimed by CANGAROO compared with H.E.S.S. results.

<table>
<thead>
<tr>
<th>Object</th>
<th>C-I</th>
<th>C-II</th>
<th>C-III</th>
<th>H.E.S.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crab</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes [2]</td>
<td>Yes</td>
</tr>
<tr>
<td>Vela X</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes [2]</td>
<td>Yes</td>
</tr>
<tr>
<td>SN1006</td>
<td>Yes</td>
<td>†</td>
<td>U.L. [1]</td>
<td>U.L.</td>
</tr>
<tr>
<td>RX J1713.7-3946</td>
<td>Yes</td>
<td>Yes</td>
<td>under analysis</td>
<td>Yes</td>
</tr>
<tr>
<td>PSR 1509-58</td>
<td>Yes</td>
<td>N/A</td>
<td>under analysis</td>
<td>Yes (MSH15-52)</td>
</tr>
<tr>
<td>Mrk 421</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>Galactic center</td>
<td>N/A</td>
<td>Yes</td>
<td>under analysis</td>
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<tr>
<td>RX J0852.0-4622</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes [3]</td>
<td>Yes</td>
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</table>

‘C-I’ means CANGAROO-I, etc. ‘Yes’: detection, ‘U.L.’: upper limit, ‘N/A’: not available. † means the result is not published yet.
<table>
<thead>
<tr>
<th>Class</th>
<th>2003</th>
<th>2005</th>
<th>2007</th>
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<td><em>PWN</em></td>
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<td>6</td>
<td>18</td>
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<tr>
<td><em>SNR</em></td>
<td>2</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td><em>Binary</em></td>
<td>0</td>
<td>2</td>
<td>4</td>
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<td><em>Diffuse</em></td>
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<tr>
<td><em>AGN</em></td>
<td>7</td>
<td>11</td>
<td>19</td>
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<tr>
<td><em>UnId</em></td>
<td>2</td>
<td>6</td>
<td>21</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
<td><strong>33</strong></td>
<td><strong>71</strong></td>
</tr>
</tbody>
</table>
Source count versus year
[T. Kifune]
Preparations for GLAST (launch Jan 2008)
- Understanding the diffuse background
  - really critical for galactic sources
- Expected science performance
  - Blazars
  - Pulsars (importance of radio ephemerides)
  - Also IC halos around massive stars

AGILE
- Blazar obs. together with TeV instruments

EGRET reanalysis and interpretation
- Catalogue revision (diffuse model change)
- Excess from the Coma direction
- Galactic diffuse emission

Studies relating GeV and TeV emission...
Do we see the same source populations in the GeV and TeV domains?

- Sensitivity mismatch of a factor 60 (EGRET lifetime / 5 h HESS survey)
- Not many EGRET/TeV positional coincidences
  - But those that exist have ‘matching’ spectra
  - This is expected by chance
- Also MILAGRO/EGRET coincidences seem statistically significant
  - Very extended objects?

Reimer 391, Funk 392
Abdo 735
OG 2.1-2.2: Galactic Sources And Diffuse Emission
# The New Galactic VHE $\gamma$-Ray Sources

<table>
<thead>
<tr>
<th>Name</th>
<th>Discovered</th>
<th>Class</th>
<th>Contributions (detections)</th>
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<td>Cyg X-1?</td>
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<td>Binary</td>
<td>MAGIC</td>
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<td>LS I +61 303</td>
<td>MAGIC</td>
<td>Binary</td>
<td>MAGIC, VERITAS</td>
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<td>HESS</td>
<td>SNR</td>
<td>HESS</td>
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<td>IC 443</td>
<td>MAGIC</td>
<td>SNR?</td>
<td>MAGIC, VERITAS</td>
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<td>W 28</td>
<td>HESS</td>
<td>SNR?</td>
<td>HESS</td>
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<td>Kes 75</td>
<td>HESS</td>
<td>PWN/SNR</td>
<td>HESS</td>
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<td>G21.5-0.9</td>
<td>HESS</td>
<td>PWN/SNR</td>
<td>HESS</td>
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<td>HESS J1023-575</td>
<td>HESS</td>
<td>Stellar Cluster?</td>
<td>HESS</td>
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<tr>
<td>MGRO J2031+41</td>
<td>Milagro</td>
<td>?</td>
<td>Milagro</td>
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<tr>
<td>MGRO J2019+37</td>
<td>Milagro</td>
<td>?</td>
<td>Milagro, Tibet</td>
</tr>
<tr>
<td>MGRO J1908+06</td>
<td>Milagro</td>
<td>?</td>
<td>Milagro, HESS</td>
</tr>
<tr>
<td>HESS J0632+057</td>
<td>HESS</td>
<td>Binary?</td>
<td>HESS</td>
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<td>HESS J1718-385</td>
<td>HESS</td>
<td>PWN?</td>
<td>HESS</td>
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<tr>
<td>HESS J1809-193</td>
<td>HESS</td>
<td>PWN?</td>
<td>HESS</td>
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<tr>
<td>HESS J1912+102</td>
<td>HESS</td>
<td>PWN?</td>
<td>HESS</td>
</tr>
<tr>
<td>HESS J1357-645</td>
<td>HESS</td>
<td>PWN?</td>
<td>HESS</td>
</tr>
<tr>
<td>+7 UnId sources!</td>
<td>HESS</td>
<td>?</td>
<td>HESS</td>
</tr>
</tbody>
</table>

Since last ICRC
Survey region was extended in the years 2005 – 2007 – many new sources!
7 year map

γ/hadron cut raises median energy to 20 TeV

3 new sources significant post trials

4 ‘hotspots’

Interesting regime of hard spectrum/extended sources
Diffuse Emission with Milagro

- Galactic plane emission, factor 2 higher than diffuse predictions, seems consistent with ~50% unresolved sources
- Large scale (>10 deg) features seen in ‘proton-like’ events – interesting, but not gamma-ray astronomy – apparently related to the tail-in anisotropy seen by Tibet
Supernova Remnants

- Long held to be the likely acceleration sites of the (hadronic) galactic cosmic rays
  - Diffusive shock acceleration
  - Require \( \sim 10\% \) efficiency of kinetic energy to CR acceleration
- Several young objects well studied in X-ray synchrotron radiation
  - Thin filaments suggest rapid cooling of electrons: \( B_{\text{shock}} >> B_{\text{ISM}} \)
Theoretical Work

- Models for hadronic $\gamma$-rays and radio-X-ray synchrotron emission from
  - Tycho (Voelk 127), SN 1987A (Berezhko 125), Kepler (Ksenofontov 126) [Also RX J1713 and Vela Jnr in OG1]

- Effects of small scale random B-fields in SNR shells
  - Jitter radiation (Yoshida 1268)

- Separation of non-thermal brems. / synch. in Cas A
  - (Allen 1175)

- Investigation of RX J1713.7–3946 with detailed hadronic interaction model
  - (Huang 681)

- Evolution of SNRs in non-uniform media
  - (Ferreira 1175)
Example: Model for RX J1713 from Voelk et al

- Magnetic field amplification assumed to be due to non-linear effects of efficient CR acceleration
- High B-fields suppress IC production

\[ \text{Beff} \approx 130 \, \mu \text{G} \]

(Note also new HESS spectrum Berge, 524)
Well known young (~1 ky) shell type SNR
RCW 86

Hillas-analysis

Model-analysis

Preliminary

Small correlation radius: 0.11°
Contours: 3, 4, 5, 6 σ

9.4 σ in 30 hours, $E^{-2.5 \pm 0.1}$ spectrum

Probably the third TeV SNR shell
TeV emission around old (>10⁴ year old) SNR – coincident with molecular clouds

First evidence for p-p in SNR/Cloud interactions

- See e.g. Aharonian, Drury & Voelk 1996
IC 443

- Distance \( \sim 1.5 \) kpc,
- Age \( \sim 30,000 \) years,
- Diameter 45’
- EGRET association?
- Maser – shocked molecular gas
- Pulsar wind nebula at edge of remnant

Composite picture, APOD 2006/06/02
IC 443

- **MAGIC 5.7σ in 29 h**
  - Steep spectrum $E^{-3.1\pm0.3}$

- **VERITAS 7.1σ in 16 h**
  - Consistent position

- Position compatible with dense gas, not PWN, not shell
  - Interaction of hadrons accelerated in SNR?
  - Morphology may be key to interpretation
Cassiopeia A

- Young and very bright radio/X-ray SNR shell
- MAGIC detection ($5.2\,\sigma$) in 47 h
- Consistent with HEGRA measurement, $\Gamma = 2.4 \pm 0.2$

Chandra, 1 Ms
Pulsar Wind Nebulae

- Major galactic TeV source population
  - Associated with relatively young (<10^5 year old) and energetic pulsars
- Generally believed that we see inverse Compton emission of 1-100 TeV electrons

Funk 2006
γ-ray PWN can be large, asymmetric and offset from the pulsar.

Need to assess chance coincidence.

HESS scan analysis shows that 70% of $\dot{E} / d^2 > 10^{35}$ erg/s/kpc$^2$ are TeV sources.

Implied efficiency Spin-down → TeV ≈ 1%
Energy Dependant Morphology

- HESS J1825-137 associated with energetic pulsar
- Spectral steepening seen away from the pulsar
- Very likely this is evidence for cooling of electrons in the Nebula
  - Seen in several X-ray PWN
- A first in gamma-ray astronomy!
New PWN Candidates

- PSR J1846-0258 in Kes 75
  - Youngest pulsar in our galaxy
- G21.5-0.9
  - Also v. young
  - PWNe of middle aged pulsars
- Geminga??
  - C3 ‘hotspot’ from Milagro – 5.1 → 2.8 σ
  - 3 degrees across – almost impossible for IACTs...

G21.5-0.9
- Also v. young
  - PWNe of middle aged pulsars
- Geminga??
  - C3 ‘hotspot’ from Milagro – 5.1 → 2.8 σ
  - 3 degrees across – almost impossible for IACTs...
The Crab Nebula

Many results reported

- **VERITAS**
  - $31 \sigma / \sqrt{h}$ with 3 tels
- **Whipple**
- **MAGIC**
  - $19 \sigma / \sqrt{h}$
  - Curvature seen
  - Peak: $77\pm47$ GeV
- **HESS**
  - Up to 80 TeV
- **Milagro**
  - First spectrum
- **ARGO YBJ**
  - $5 \sigma$ in 50 days ($\sim 2 \sigma$ in 50 days for Milagro)

**Graph**

- **Otte 1078**
- **Celik 1290**
- **Yodh 710**
- **Grube 543**
- **Martello OG2.7**
Upper limits on pulsed emission from many groups:
- PACT
- Tibet
- HESS
- STACEE

Hints for pulsed emission from the Crab pulsar at 60-180 GeV from MAGIC!
- 2.9 $\sigma$ in 16 hours of data
- Should/could be confirmed very soon...

Otte 1078
Acharya 517
Amenomori 844
Füssling 572
Kildea 830
Gamma-ray Binaries

γ-rays produced in the shock where the wind of the young pulsar and the wind of the Be star collide
Dubus (2006), Dhawan et al. (2006)

Microquasar: particles (electrons or hadrons) are accelerated in a jet
Bosch-Ramon et al. (2006), Romero et al. (2007)
Variable (flaring) mostly at phase 0.5-0.85 – but not really periodic?

Overall correlation with X-ray – but many differences

A real challenge to modellers!
- Strong modulation of flux and spectrum with orbital phase
  - Beautifully measured!
- Maximum is when star lies in front of compact object along the line of slight
- Absorption/cascading effects?

*De Naurois 1305*
Cygnus X-1: A VHE Emitter?

- Black hole binary \( M_{BH} > 13 M_\odot \), \( M_{\text{star}} \sim 30 M_\odot \)
- Relativistic jet \( v > 0.6 \) c
- 40 hours of MAGIC observations
- 4.9 \( \sigma \) signal seen in one 79 minute time slice
- Estimated significance 4.1 \( \sigma \) after correction for statistical trials
- Very exciting but not yet firmly established as a VHE source

Gallo et al. 2005

Rico 551
PSR B1259-63 Periastron

- Periastron passage in 16 days! (3.4 year period)
- Extensive MWL campaign
  - HESS – April-August
  - Suzaku - July
  - Chandra - August

[Image: HESS June 2007]
Extended gamma-ray emission covering (but offset from) Westerlund 2

Due to collective effects of stellar winds in the cluster?

A new source class?

See also model of Anchordoqui 407
The Galactic Centre

- Very high precision (6” stat, 6” sys) measurement of GC TeV source location by HESS
  - Sgr A East excluded as the source
- Sgr A*?
  - No increase during X-ray flare
  - No variability or QPO found...

Hinton 463, Vivier 1023
New HESS Sources Without Counterpart

- 6 new TeV gamma-ray sources
  - none with compelling counterpart
- Relegated to a poster!
MGRO J2019+37

- **MILAGRO**
  - Bright extended source coincident with GeV source
  - $10.4\,\sigma \rightarrow 9.3\,\sigma$ post-trials

- **Tibet AS$_\gamma$**
  - $5.8\,\sigma$ excess close to MILAGRO position

- **Point-source limits from MAGIC + VERITAS**
  - No contradiction to MILAGRO flux for hard spec. extended sources
Confirmation of Milagro source by HESS

- First confirmed TeV source not detected by an IACT
- \(9.4 \sigma\)
- 30\% Crab flux > 1 TeV
- \(E^{-2.05}\) spectrum
- \(\sigma_{\text{src}} = 0.21^\circ\)
MGRO J1908+06

**Consistent with MILAGRO flux**

\[ \Phi_0 = 0.64 \pm 0.06 \times 10^{-11} \text{ cm}^{-2} \text{ s}^{-1} \text{ TeV}^{-1} \]
\[ \gamma = 2.05 \pm 0.06 \]
OG 2.4: Gamma-Ray Bursts
- Frequent – mostly SWIFT burst alerts provided via GCN
- All major IACTs slew rapidly on receiving alerts
Several challenges for VHE GRB observations

- Redshift reach limited by EBL absorption to $\ll 1$
  - Roughly one third of GRBs
  - Relatively small fraction have measured redshift – without which limits are not meaningful

- IACTS
  - Limited duty cycle, small FoV, response time

- Non-Imaging
  - Sensitivity (angular resolution, eff. area, threshold)

Many instruments routinely follow GRB triggers

- Whipple, VERITAS, MAGIC, HESS, STACER, ...
- Wide field of view instruments such as Milagro get more bursts with zero delay – but worse sensitivity
- Several years of follow-up observations...
Experimental Work: Upper Limits

- **MAGIC**
  - 42 second mean repositioning time
  - 23 follow-ups of GRBs (8.3% duty cycle)
  - GRB050713a, 40 second response, but no z known

- **VERITAS + Whipple**
  - Ongoing program. 3 GRBs obs. with VERITAS so far

- **HESS**
  - 17 follow-ups
  - 1 prompt GRB obs: GRB060602b!

- **STACEE**

- **MILAGRO**
  - VHE band and 1-100 GeV

- **ARGO YBJ**

- **Auger + LAGO + IceCube**

(Names and page numbers are: Garczarczyk 566, Horan 406, Tam 466, Tam 464, Jarvis 409, Vasileiou 674, Aune 689, Girolamo 1034, Bertou 1042, 175, Kappes 1132)
GRB FOLLOW-UP LIMITS

- Observations have taken place during periods of strong X-ray activity, e.g.
  - MAGIC
  - GRB 050713a
  - STACEE
  - GRB 050607
- But not yet for bursts with known redshift...
Simultaneous GRB Observation

GRB 060602b – simultaneous observation with HESS by chance (2.5°)!
But no redshift found – and may have been a galactic X-ray burster
Looks as if **bright** 1-100 GeV emission is not common in GRBs
Other GRB Contributions

- Theoretical Work
  - Compton dragged supercritical piles
  - Synchrotron emission modelling
  - Radiation from Internal Shocks in Magnetized Flows
  - Opacity build-up

- Suzaku WAM Observations

- Expectations for GLAST GMB/LAT
  - GMB 220 bursts/year
  - LAT 40 alerts/year – but only 1/year with sufficient accuracy for IACTs
OG 2.3: Extragalactic Sources
## Extragalactic VHE Gamma-Ray Sources

<table>
<thead>
<tr>
<th>Name</th>
<th>Discovered</th>
<th>Year</th>
<th>z</th>
<th>Contributions</th>
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<tbody>
<tr>
<td>M 87</td>
<td>HEGRA</td>
<td>2003</td>
<td>0.004</td>
<td>VERITAS-Colin, HESS-Beilicke, MAGIC-</td>
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<tr>
<td>Mrk 421</td>
<td>Whipple</td>
<td>1992</td>
<td>0.031</td>
<td>MILAGRO-Smith, VERITAS-Fegan, +</td>
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<tr>
<td>Mrk 501</td>
<td>Whipple</td>
<td>1996</td>
<td>0.034</td>
<td>TACTIC-Godambe, MAGIC-Paneque, +</td>
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<tr>
<td>1ES 2344+514</td>
<td>Whipple</td>
<td>1998</td>
<td>0.044</td>
<td>MAGIC-Wagner</td>
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<td>Mrk 180</td>
<td>MAGIC</td>
<td>2006</td>
<td>0.046</td>
<td>MAGIC-Mazin</td>
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<tr>
<td>1ES 1959+650</td>
<td>TA</td>
<td>2002</td>
<td>0.047</td>
<td>MAGIC-Hayashida</td>
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<tr>
<td>BL Lac</td>
<td>MAGIC</td>
<td>2006</td>
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<td>MAGIC-Hayashida</td>
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<tr>
<td>PKS 0548-322</td>
<td>HESS</td>
<td>2006</td>
<td>0.069</td>
<td>HESS-Superina</td>
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<td>PKS 2005-489</td>
<td>HESS</td>
<td>2005</td>
<td>0.071</td>
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<td>PKS 2155-304</td>
<td>Durham</td>
<td>1999</td>
<td>0.116</td>
<td>HESS-Punch, CANGAROO-Sakamoto, +</td>
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<td>H 1426+428</td>
<td>Whipple</td>
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<td>0.129</td>
<td>VERITAS-Krawczynski</td>
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<td>1ES 0229+200</td>
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<td>H 2356-309</td>
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<td>1ES 1101-232</td>
<td>HESS</td>
<td>2005</td>
<td>0.186</td>
<td>HESS-Puelhofer</td>
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<td>1ES 0347-121</td>
<td>HESS</td>
<td>2007</td>
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<td>HESS-Raue</td>
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<tr>
<td>1ES 1011+496</td>
<td>MAGIC</td>
<td>2007</td>
<td>0.212</td>
<td>MAGIC-Mazin</td>
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<td>PG 1553+113</td>
<td>HESS/MAGIC</td>
<td>2005</td>
<td>?</td>
<td>MAGIC-Wagner, HESS-Benbow</td>
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<tr>
<td>3C 279</td>
<td>MAGIC</td>
<td>2007</td>
<td>0.536</td>
<td>MAGIC-Teshima</td>
</tr>
</tbody>
</table>

8 new AGN
100 GeV threshold implies $z < 1$ (but need very luminous sources!)
EBL LIMITS FROM VHE SPECTRA

- Combined limits from all VHE blazars
- Direct limits
- Galaxy Counts
- See Püllhofer 555

Mazin 1045

H.E.S.S. 1ES 1101-232

OPTICAL  NIR  MIR  FIR

$\lambda$ (μm)

$V_{\lambda}$ (nW m$^{-2}$ sr$^{-1}$)
EBL LIMITS FROM VHE SPECTRA

Direct limits

First stars?

Reduced by 1ES 0229+200
z=0.14

Confirmed by 1ES 0347-121
z=0.188

HESS: Raue 568

Optical
NIR
MIR
FIR

λ (μm)
Theoretical work

- **Blazars**
  - time variability
  - Effects of expansion
- **EBL**
  - A unique absorption signature?
  - Combined limits
- **Galaxy Clusters**
  - Giant AGN outbursts
- **Globular clusters**

---

**References**

- Milovanovic 304
- Pohl 682
- Imran 683
- Mazin 1045
- Domainko 882
- Bednarek 26
Famous nearby radio galaxy
- 16 Mpc, Jet angle \( \sim 30^\circ \)

**HESS 2 day variability**
- Emission region \(< 5 \delta R_s\)

**VERITAS 5.1 \( \sigma \)**
- Observations in 2007

**Emission site?**
- Knot HST1?
- Very close to SMBH?

**Mechanism?**
- Hard spectrum \( \Gamma = 2.2 \) is a challenge for `standard' models
Colin 756

Prime candidate for coordinated VERITAS/HESS/MAGIC + MWL observations in the future
BL Lacs

- Jets aligned very close to line of sight
  - Beaming allows us to see very distant objects with modest sensitivity
- Characteristic double peaked spectrum

![BL Lacs Diagram](image)

![BL Lacs Graph](image)

Hayashida 946
First Low energy peaked BL Lac observed at VHE energies

- Steep ($\Gamma = -3.6 \pm 0.5$), not due to absorption – intrinsic low energy peaked source
- There will be many more if we reach lower sensitivity!
Several campaigns with optical, keV & TeV on were presented.
A wealth of detail for modelers
Synchrotron self compton models still seem able to explain most HBL observations
Optical Triggers → New Blazars

Mrk 180 and 1ES1011+496 (z=0.212!) discovered at VHE energies by MAGIC following optical triggers.

Optical monitoring of AGN much easier than X-ray, if a connection exists (even on ~month timescales) then the efficiency of TeV blazar observations can be considerably improved.
Mrk 501 Flares

- June 30th flare has \( \sim 3 \text{ minute} \) variability (but is not so strong statistically), July 9th better measured but slower
- First big flare seen by a third generation Cherenkov instrument
- But...
Huge Flare From PKS 2155-304

- Best measured risetime: $173 \pm 28 \text{ s}$
- Two orders of magnitude brighter than typical state

HESS 28th July 2006
Huge Flare From PKS 2155-304

Comparison of Mrk 501 (MAGIC) and PKS 2155-304 (HESS) flares

Crab Flux

Benbow 1221

Paneque 1098

HESS

28th July 2006
3C 279

- Brightest EGRET AGN, Flat Spectrum Radio Quasar
- Redshift of 0.538
3C 279: One night, 23rd Feb 2006

- 6.1 σ in low Energy band
- Post-trails?
- 5.1 σ >220 GeV
- Surprising!

Sky map around 3C279

80-220 GeV

E > 220 GeV

Preliminary
Upper Limits On Other Object Classes

- Starburst galaxies
  - HESS: NGC 253 & M 83
- Galaxy clusters
  - CANGAROO-III
    - Abell 3667 & Abell 4038
  - HESS
    - Abell 496 & Coma
- Ultra luminous IR galaxies
  - MAGIC Arp 220
- Non-beamed extragalactic objects may be too dim for current TeV instruments
  - GLAST may help with target selection

Nedbal 468
Kiuchi 428
Domainko 535
Vitale 1288
Serious Conclusions

- VHE $\gamma$-rays is currently a very active field
- Number of sources is rising rapidly but also the precision with which the bright sources can be measured
  - E.g. Energy dependant morphology in HESS J1825-137, 6" location acc. at the Galactic Centre with H.E.S.S.
- The redshift range has been more than doubled!
  - MAGIC detection of 3C 279
- Expect $>100$ VHE sources at the next ICRC
  - VERITAS is now fully operational
  - First MAGIC-II sources?
- and $>1000$ GeV sources from GLAST!
LESS SERIOUS CONCLUSION

- Basically we are all very happy