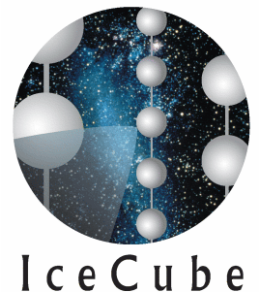


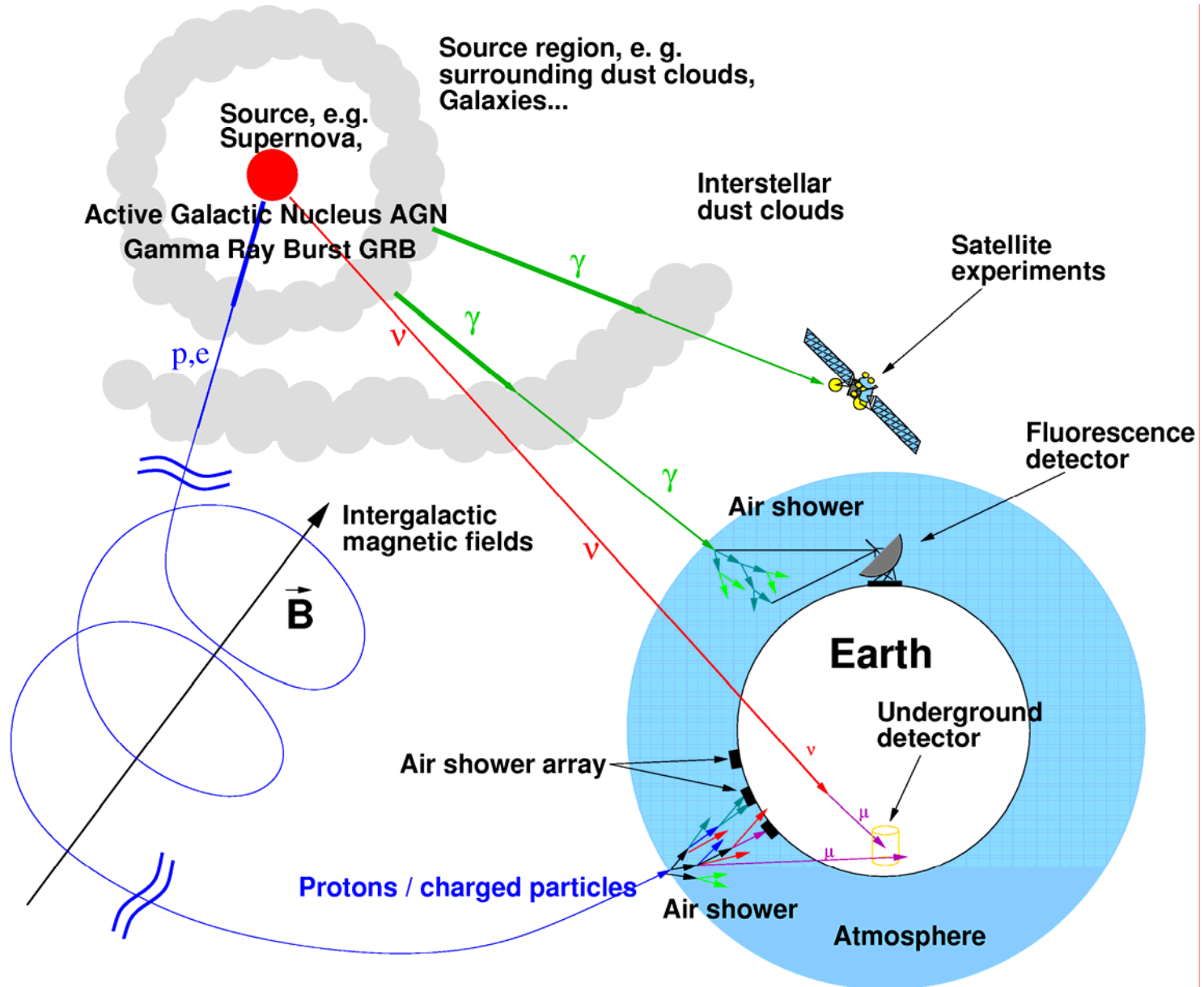
Analysis strategies and recent results from AMANDA-II



Kirsten Münich
University of Dortmund, Germany

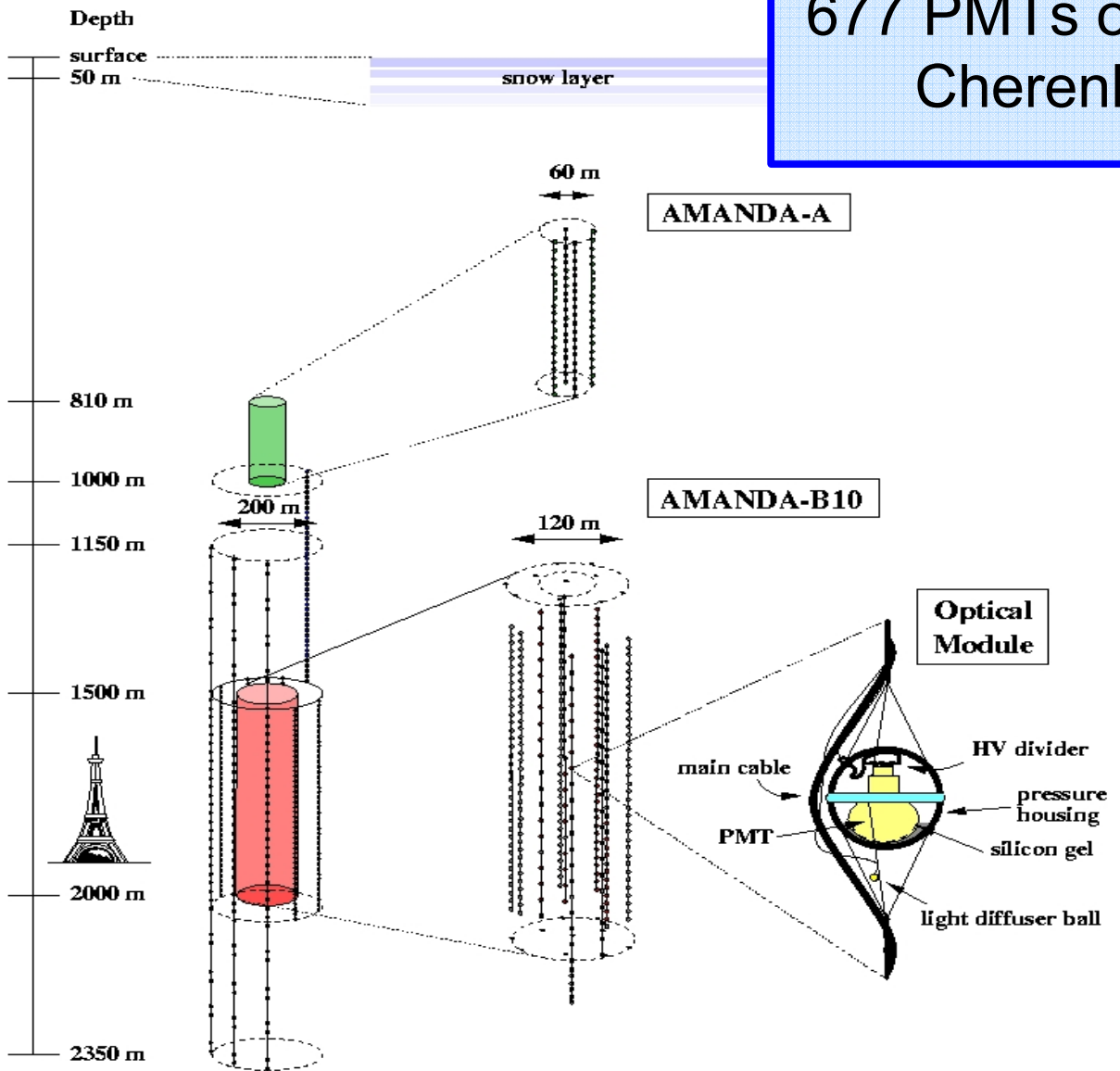
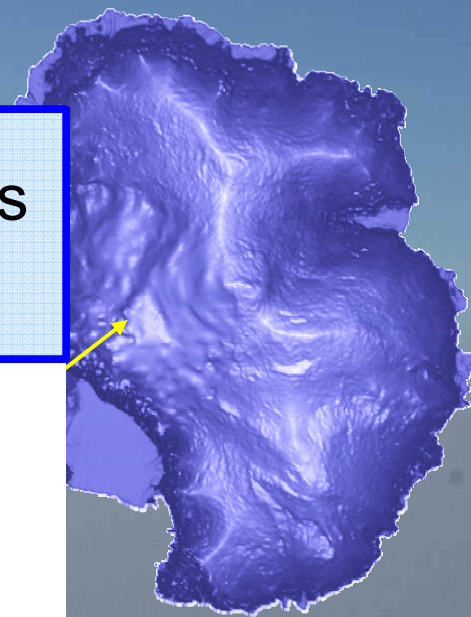


- **Introduction:**
 - Neutrino detection
 - AMANDA-II
- **Analysis strategies results:**
 - Point-source
 - Stacking of point-source (AGN)
 - Isotropic / diffuse analysis
- **Diffuse energy spectrum**



AMANDA/IceCube

677 PMTs on 19 strings
Cherenkov light



AMANDA as of 2000
Eiffel Tower as comparison
(true scaling)

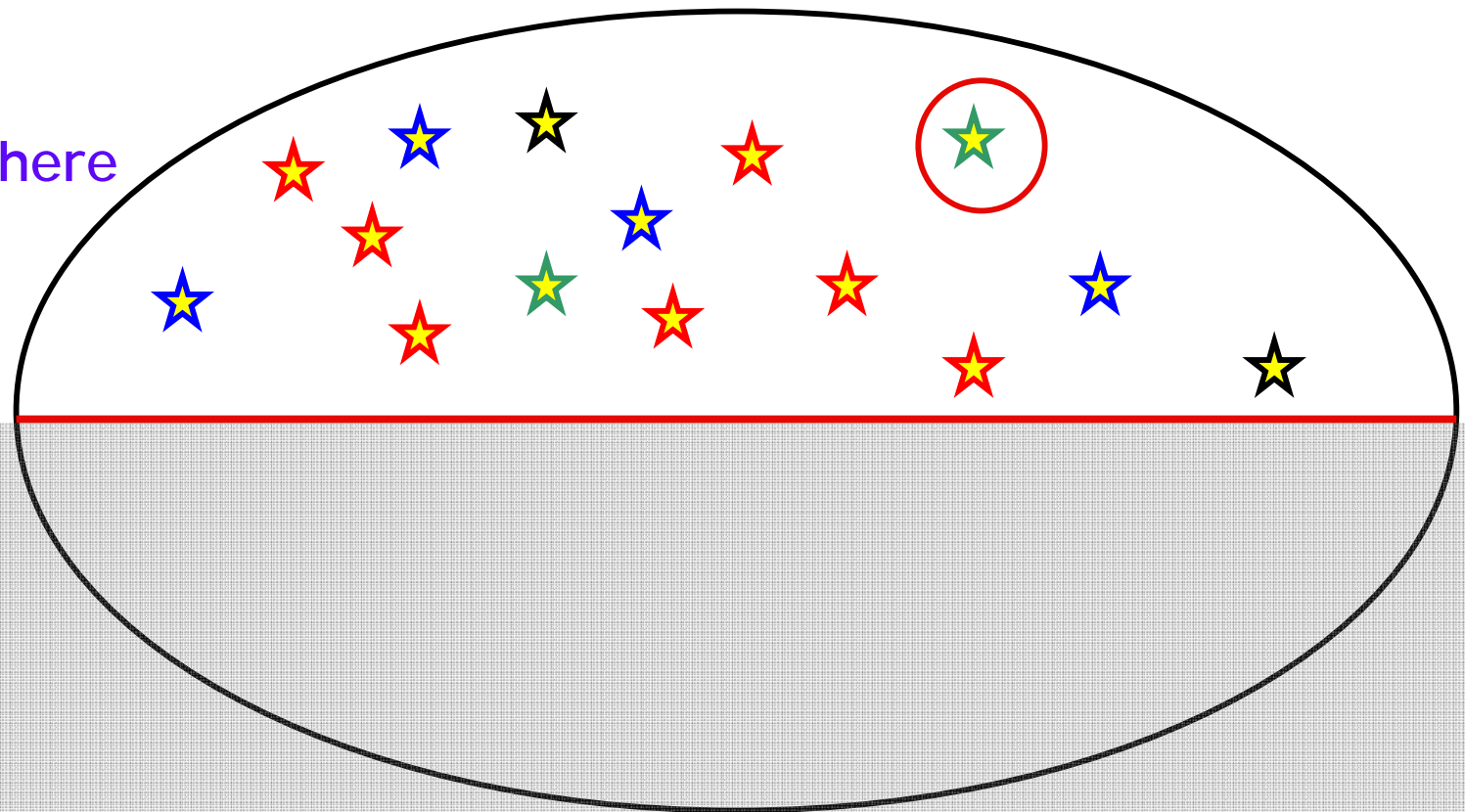
zoomed in on
AMANDA-A (top)
AMANDA-B10 (bottom)

zoomed in on one
optical module (OM)



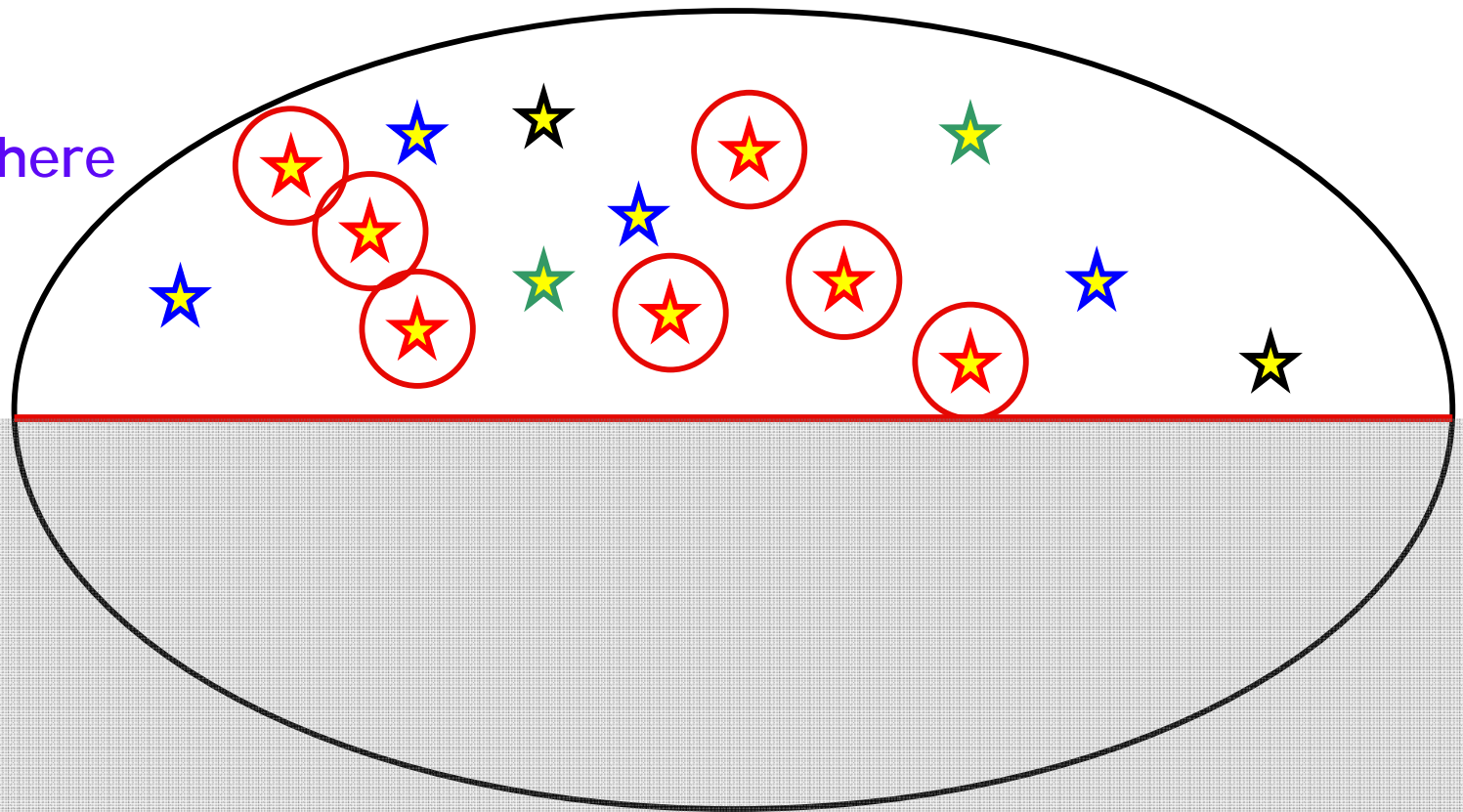
Point source searches - significance map ?clustering of neutrinos
identified photon sources

AMANDA/IceCube
field of view:
northern hemisphere



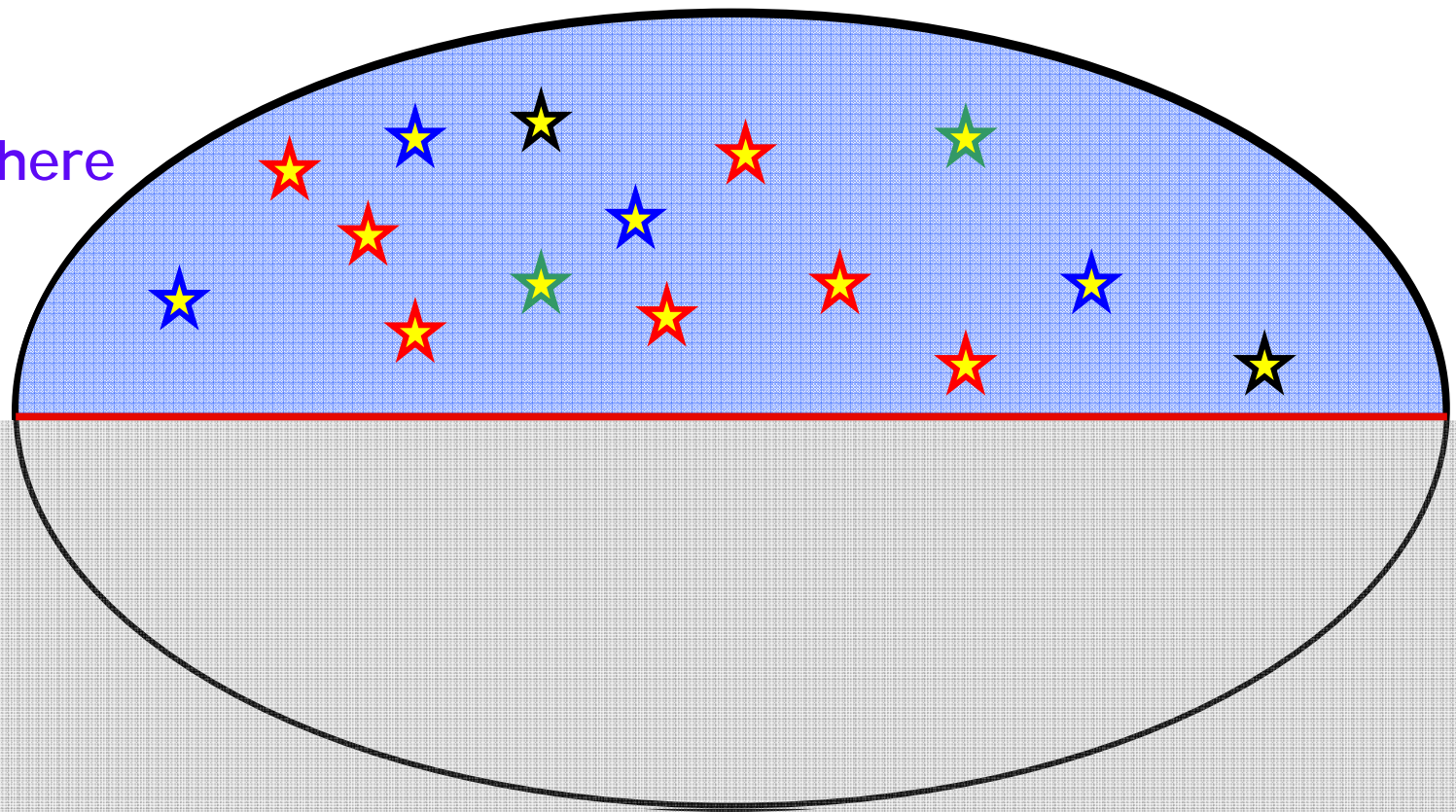
Stacking strategy - sum signal of point sources of same source class

AMANDA/IceCube
field of view:
northern hemisphere



Search for a diffuse signal: use complete northern hemisphere

AMANDA/IceCube
field of view:
northern hemisphere

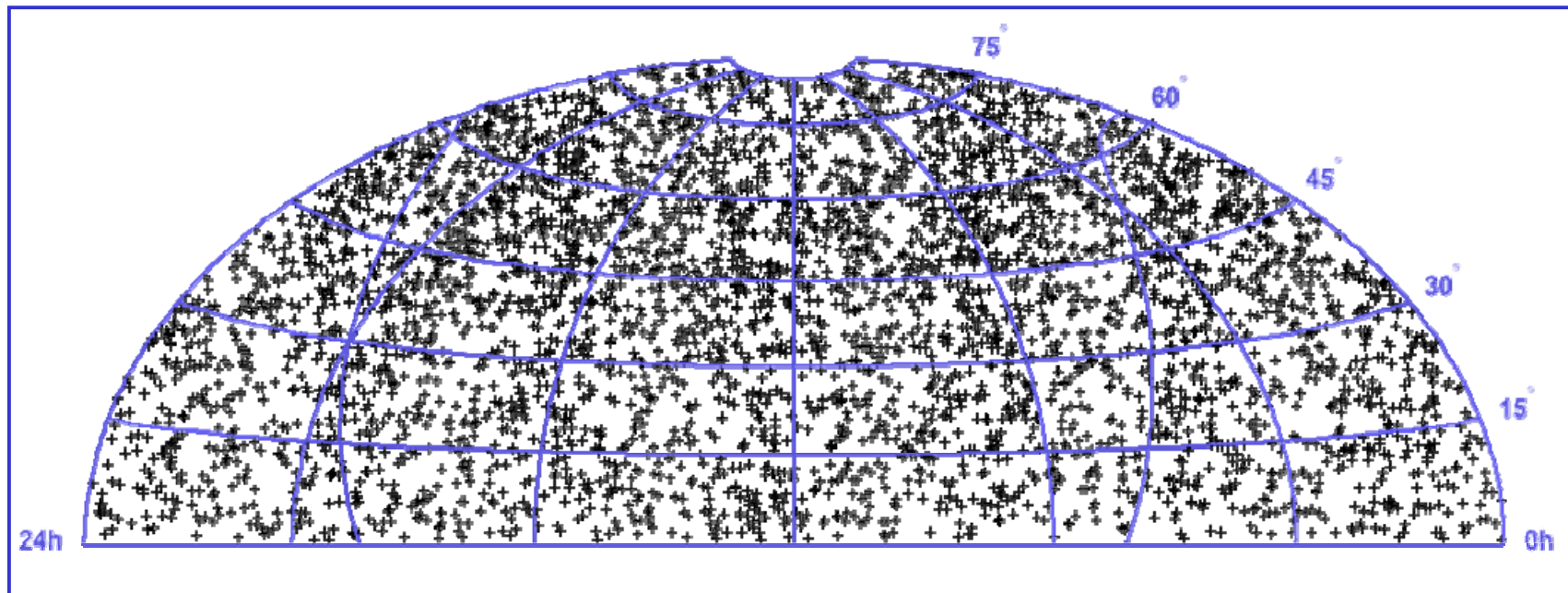


great 😊 but too short time!

- Cascade analyses
- Transient searches:
 - Flares of permanent objects
 - Gamma Ray Bursts → stacking approach, temporal clustering
 - SGR 1860-20
- Dark matter searches
 - WIMPs
 - Magnetic Monopoles
- Atmospheric muons, charm contribution

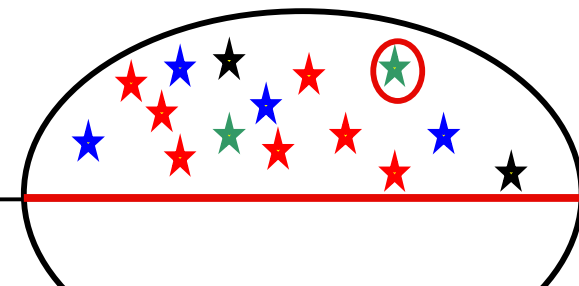
Event map

4282 events in 5 years (2000-2004) -effective time: 1001 days

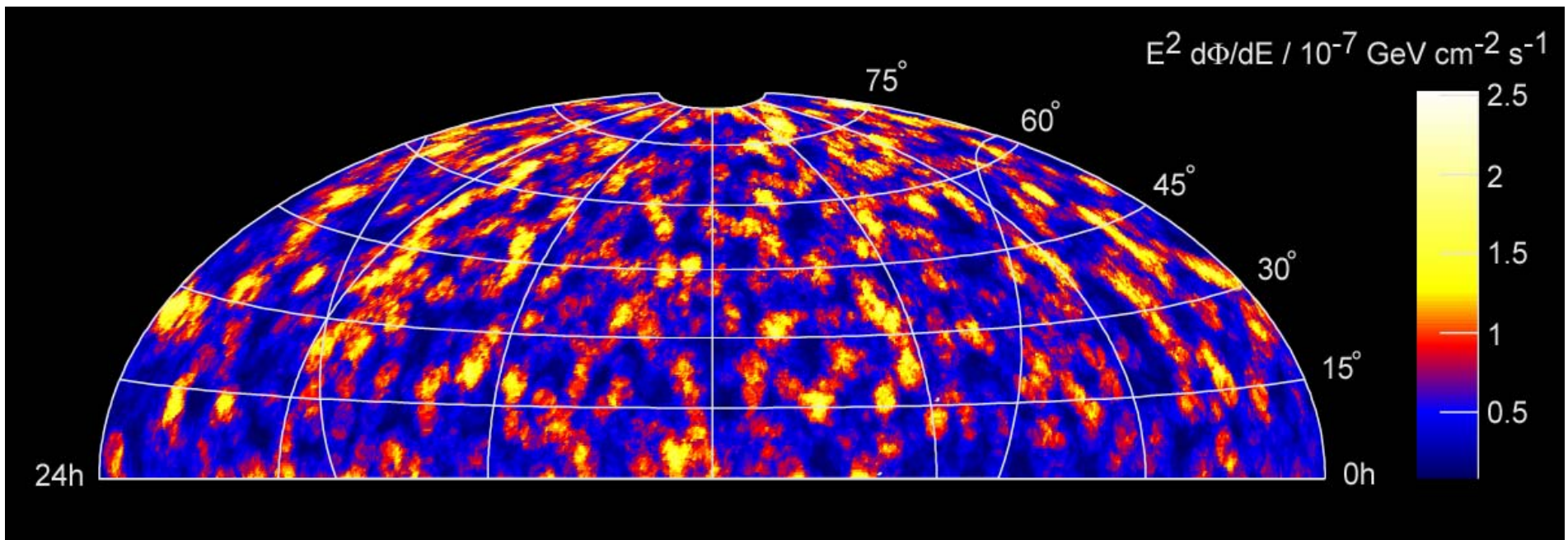


90% confidence level flux upper limits for the northern hemisphere
in 0.5 deg bins (15% systematic error included)

Achterberg et al. 2007, astro-ph/0611063

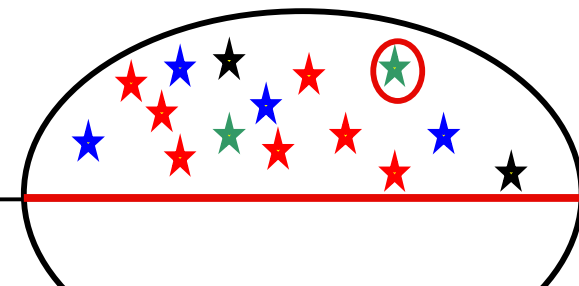


Limit map
No significant signal



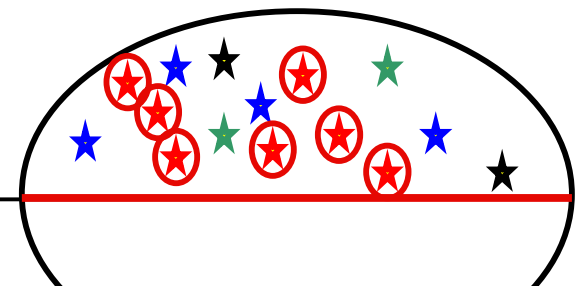
90% confidence level flux upper limits for the northern hemisphere
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Achterberg et al. 2007, astro-ph/0611063

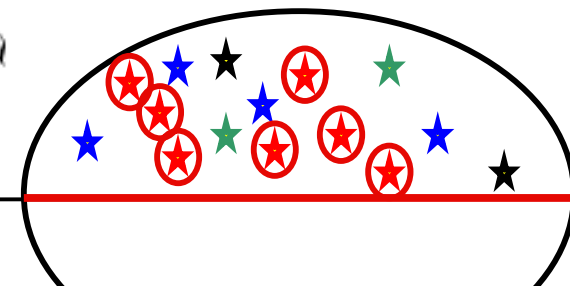
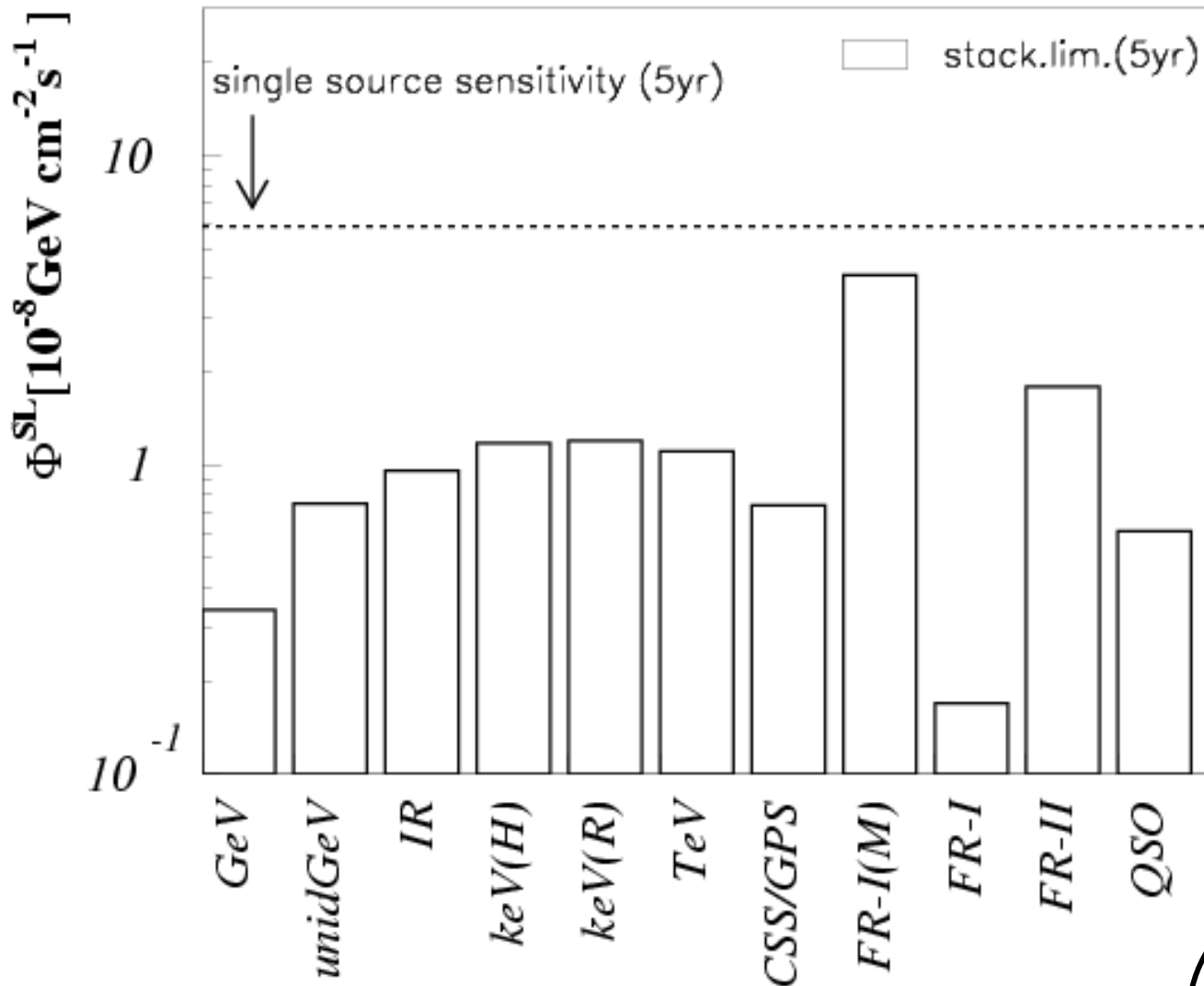


- GeV blazars (**EGRET**) – *GeV*
- **Unidentified EGRET** sources – *unidGeV*
- **Infrared** sources – *IR*
- HAO-A-detected **keV** sources – *keV(H)*
- ROSAT-detected **keV** sources – *keV(R)*
- **TeV** blazars - *TeV*
- **Compact Steep Spectrum** and **Giga-Hertz** peaked sources – *CSS/GpS*
- **FR-I** galaxies including **M87** – *FR-I(M)*
- **FR-I** galaxies without M87 – *FR-I*
- **FR-II** galaxies – *FR-II*
- Radio-weak **quasars** – *QSO*

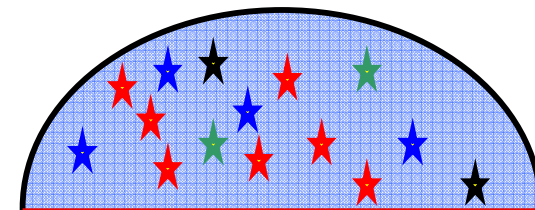
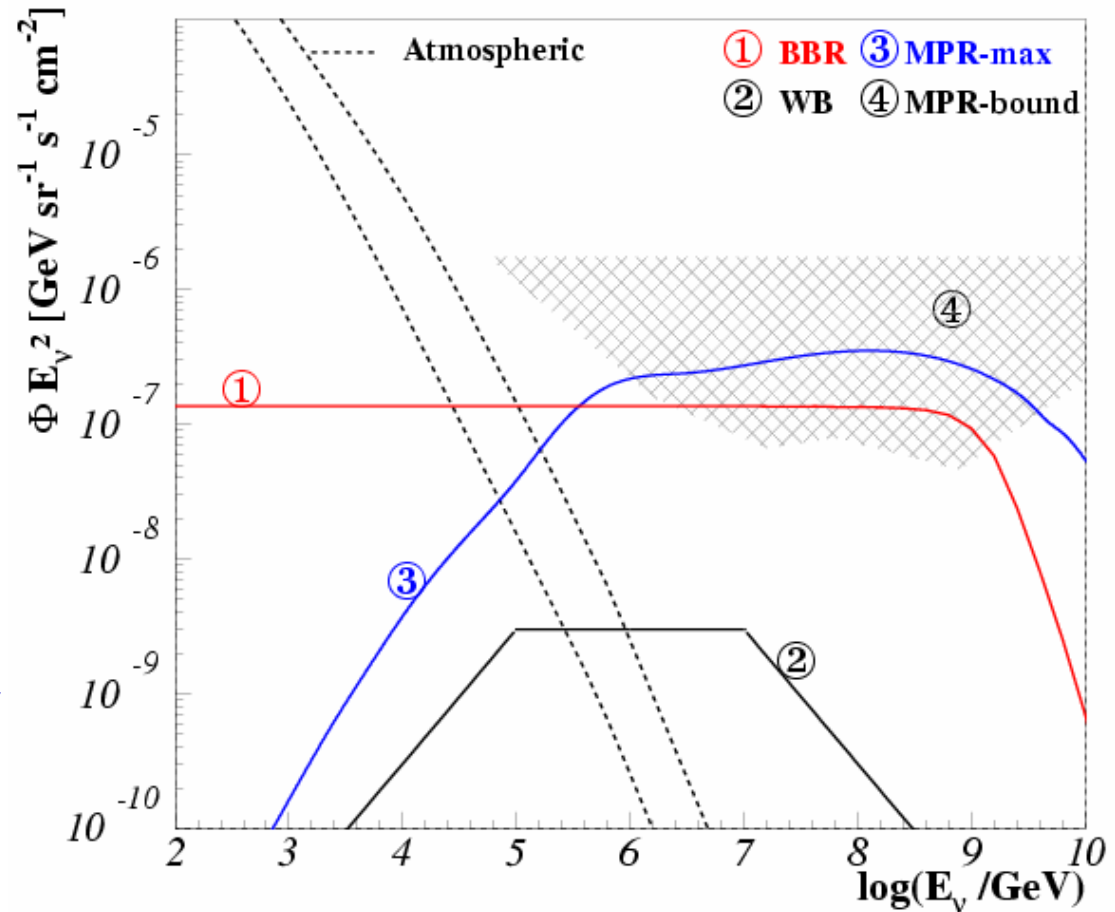
Achterberg et al. 2007, astro-ph/0611063

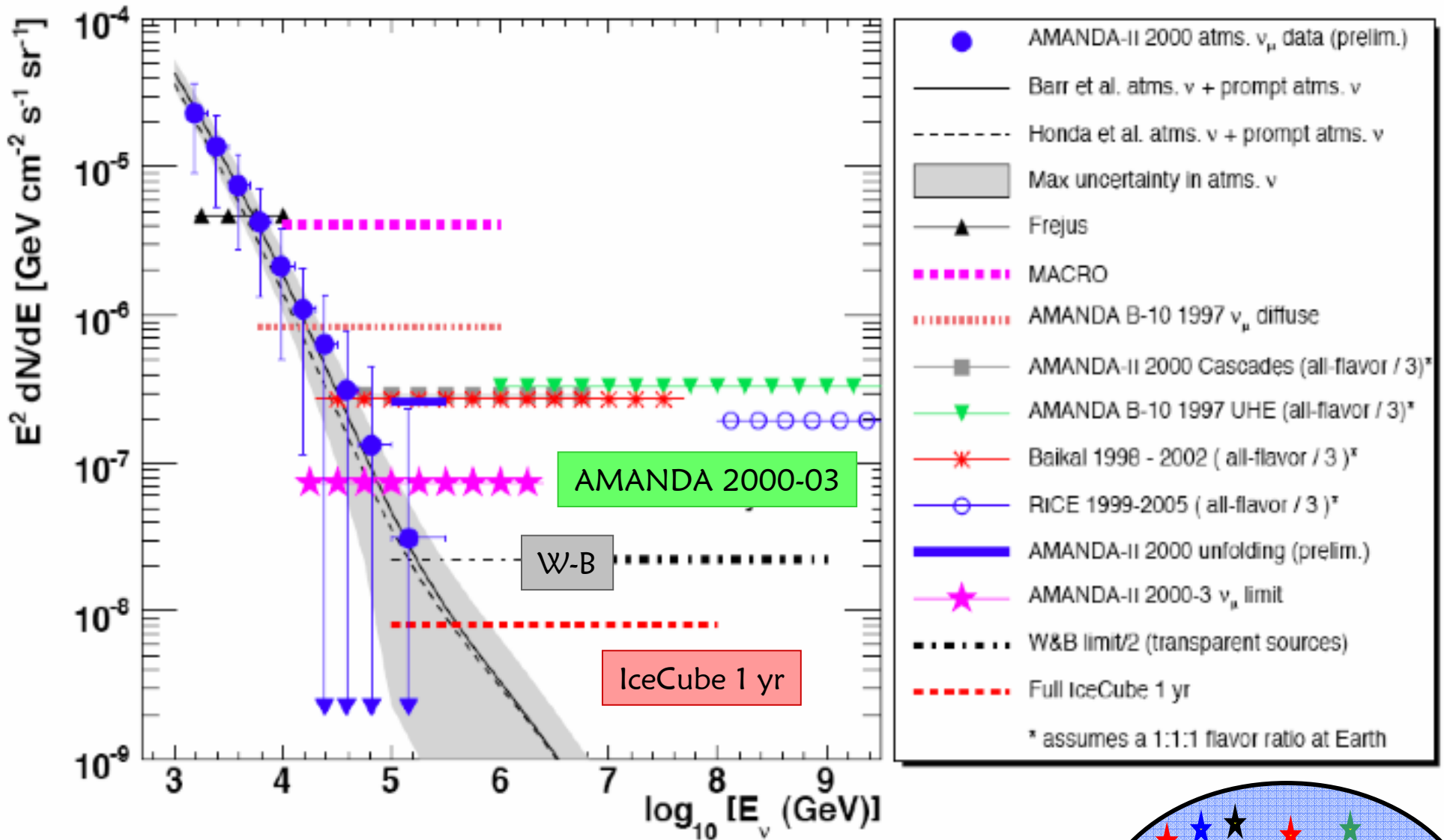


Achterberg et al. 2007, astro-ph/0611063

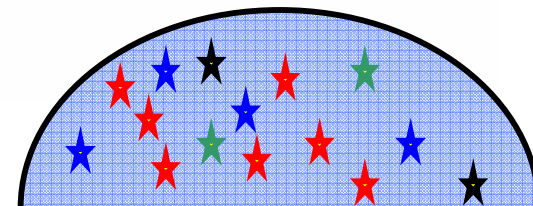


- Atmospheric neutrino flux follows $E_\nu^{-3.7}$
- Search for extra-galactic contribution
 - **AGN (1)**
(Becker/Biermann/Rhode)
 - **AGN (3 and 4)**
(Mannheim/Protheroe/Rachen)
 - **GRBs (2)**
(Waxman/Bahcall)

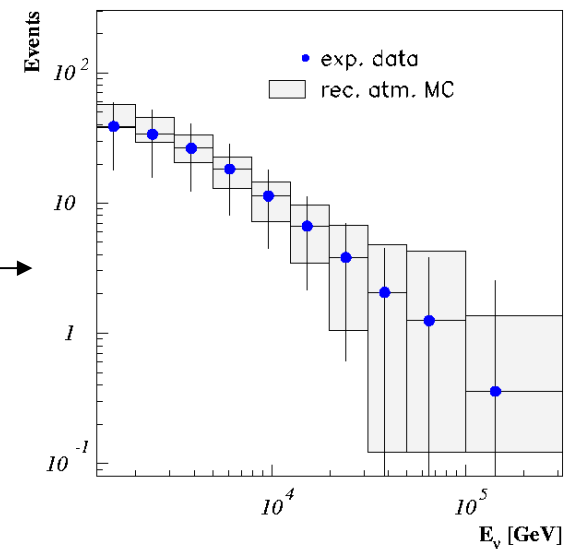
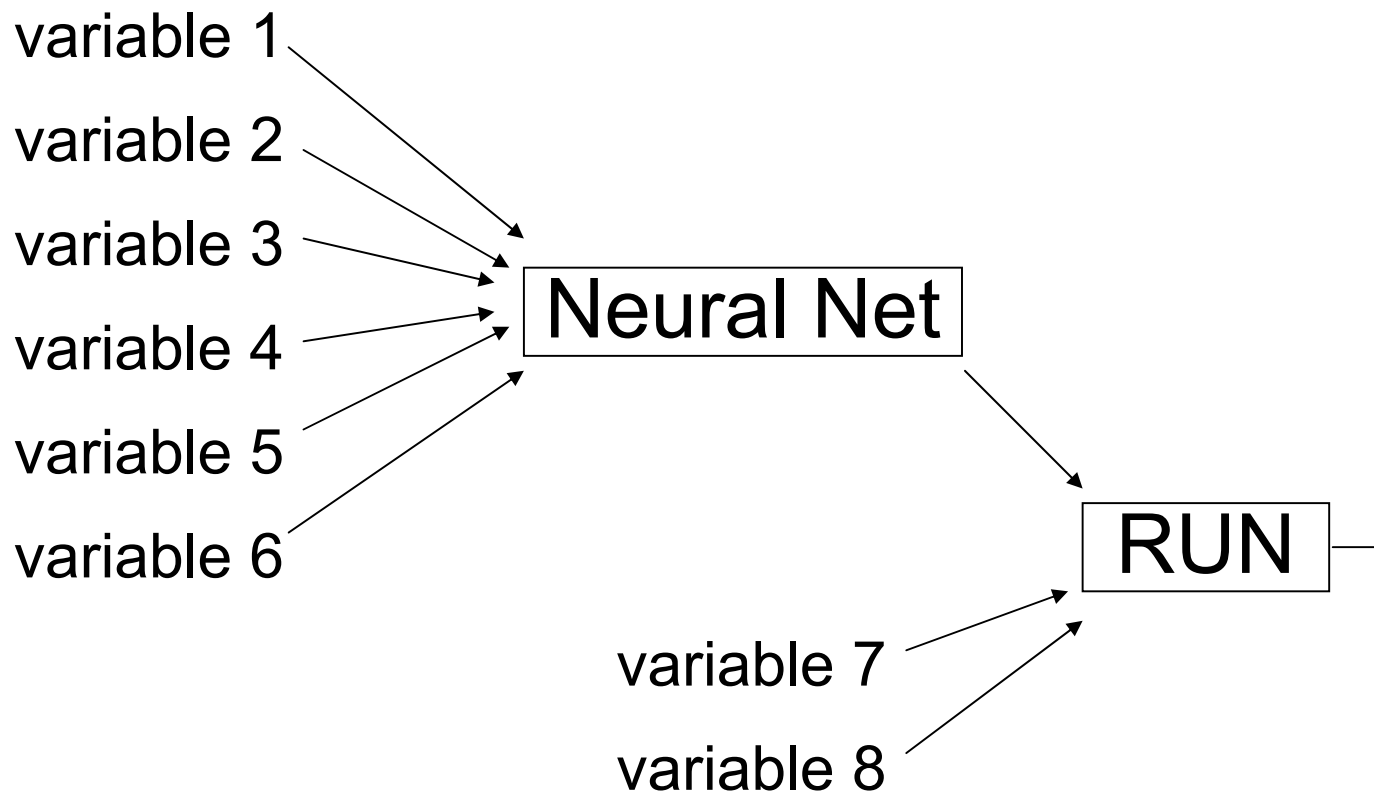




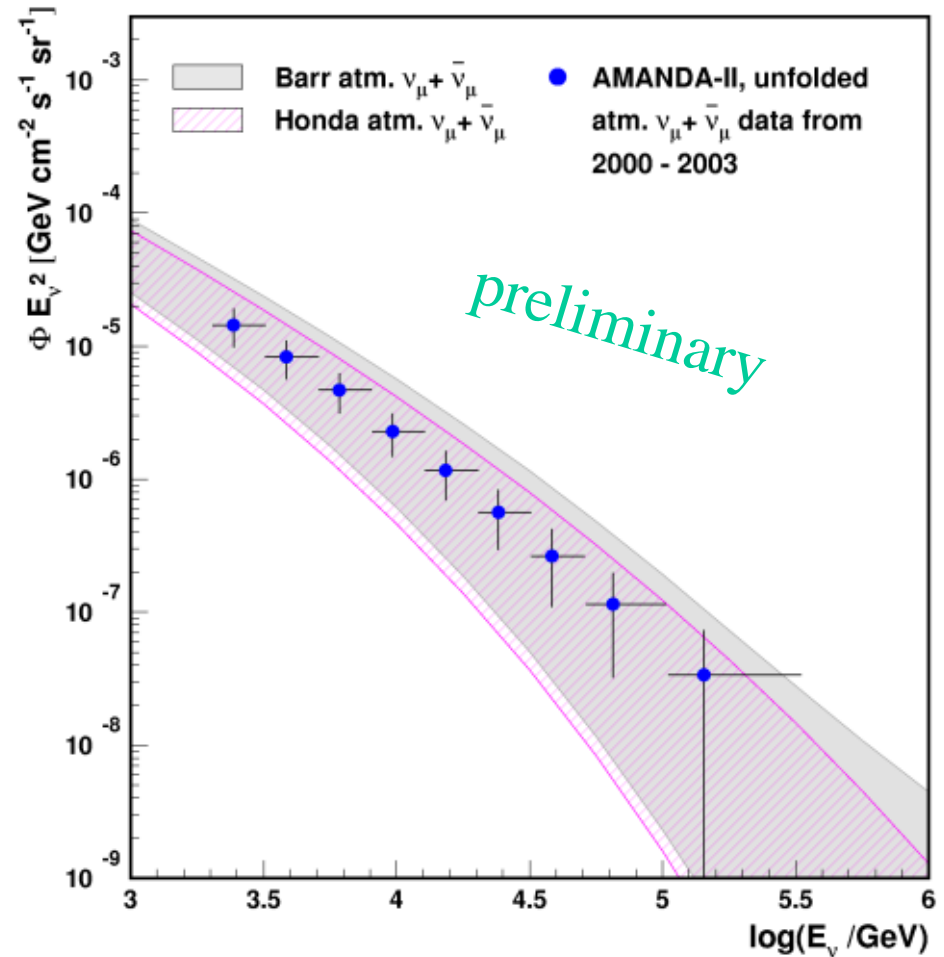
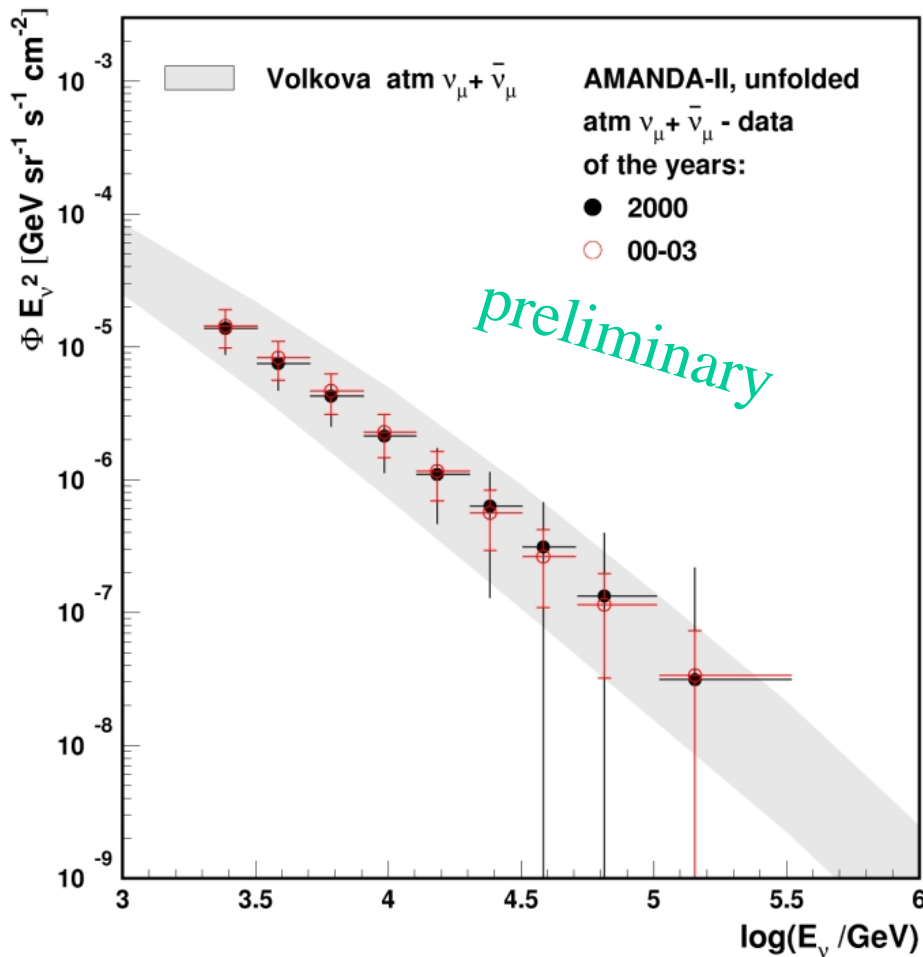
Achterberg et al., astro-ph/0705.1315

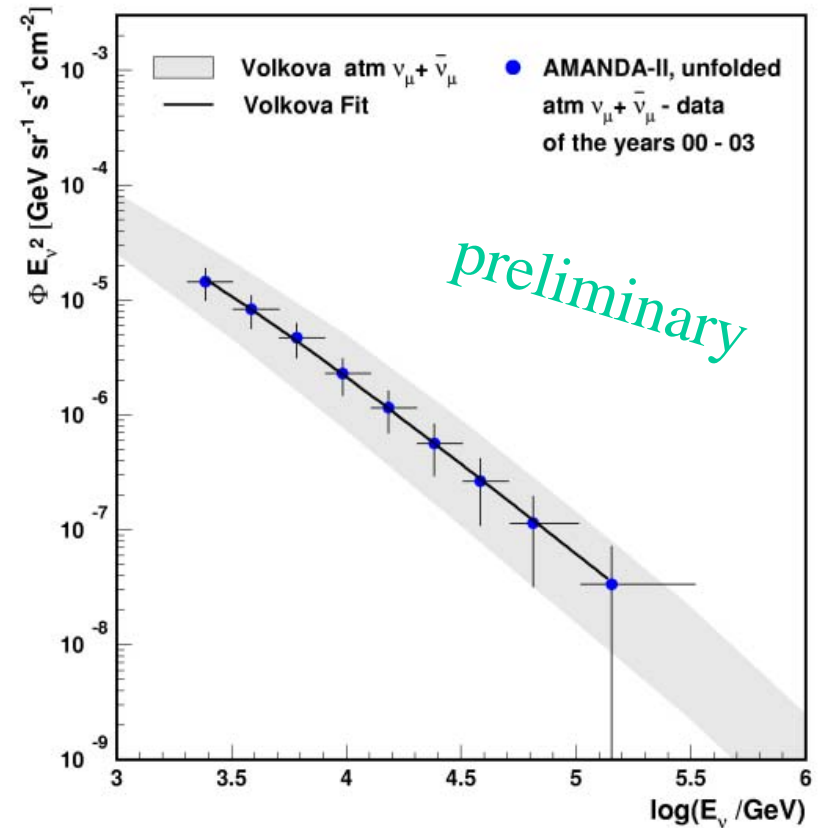
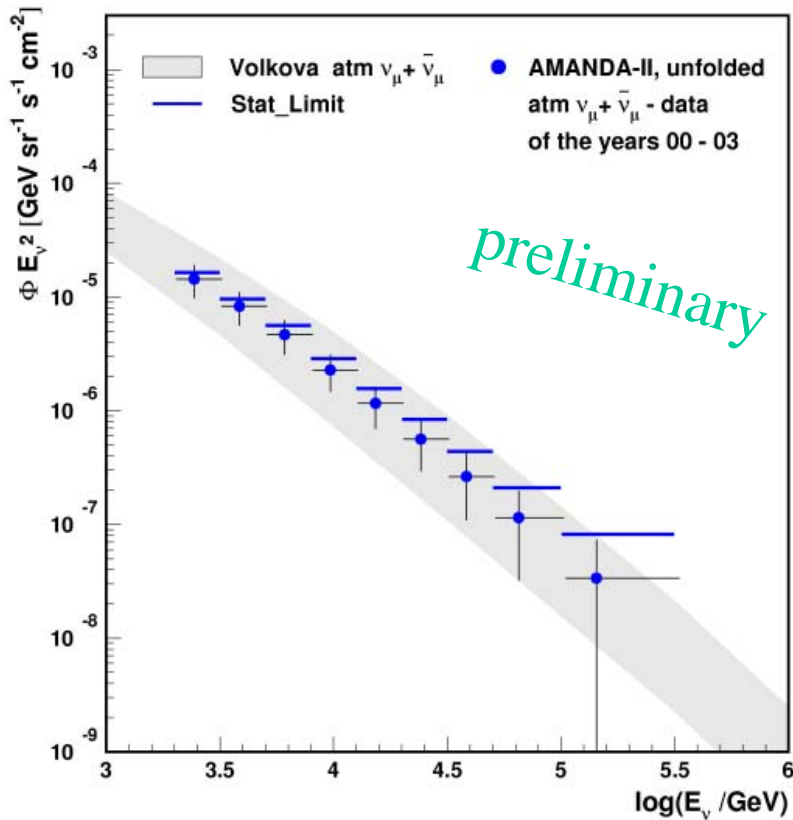


- General case:
 - measured distr. \rightarrow unfolding \rightarrow true distr.
- Using RUN for unfolding:
 - measured distr. A (E)
 - measured distr. B (E) \rightarrow RUN \rightarrow energy distribution
 - measured distr. C (E)
- More than three measured distributions (E):
 - combine N-2 observables to a new variable
 - using a neural network for combining

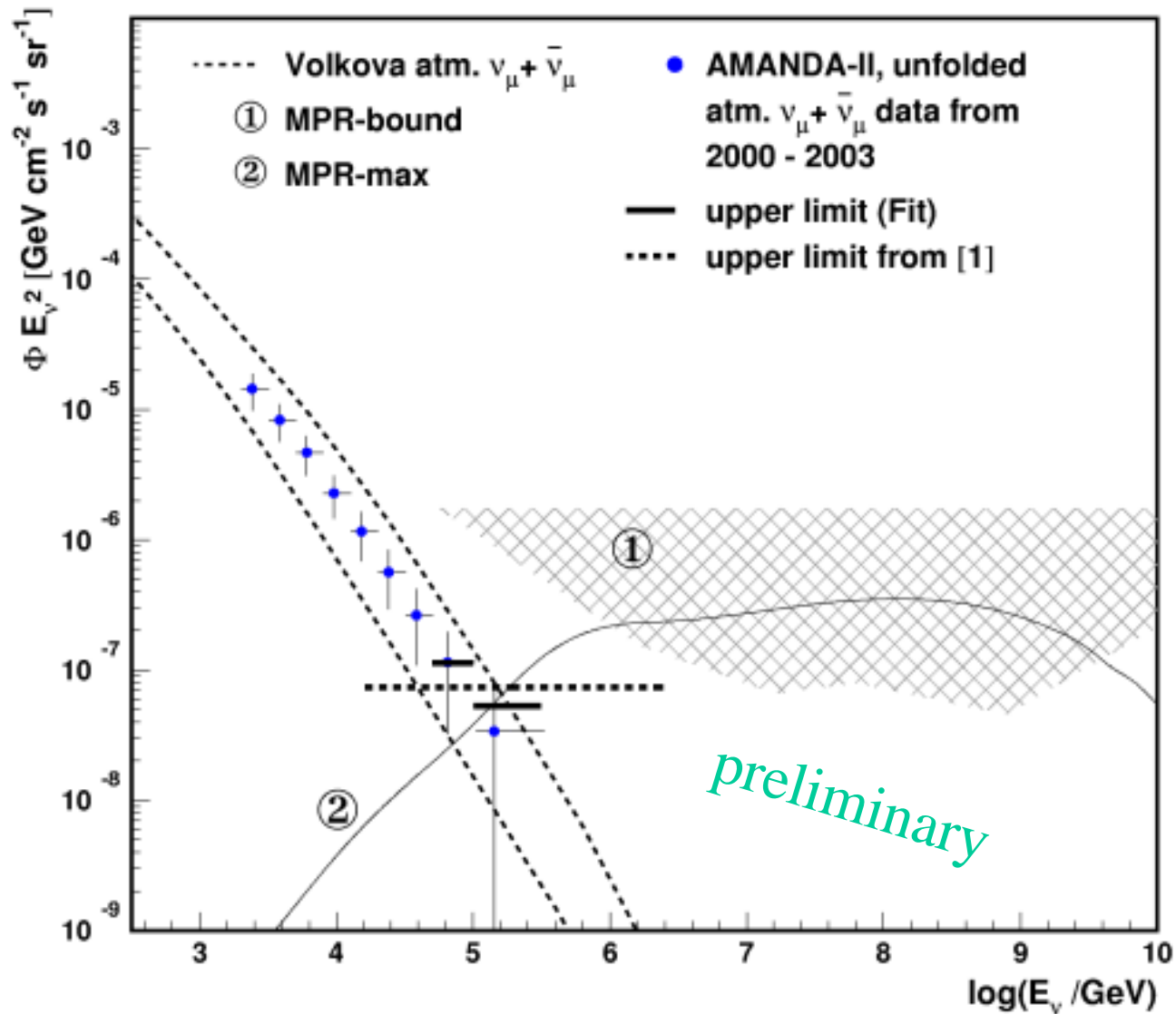


comparison: result 2000 with 2000-2003





- Fit on the atmos. prediction (Volkova)
- (atmos.+ extrat.) ν flux – (fit value) ν flux



[1] Achterberg et al., astro-ph/0705.1315

- Data from 2000-2004 taken with AMANDA-II are analyzed
- Different search strategies:
 - Steady point sources (**single sources & stacking**)
 - **Diffuse search**, spectrum up to **100 TeV**
 - ...and more...
- Analyses show so far no signal above atmospheric flux
- Constraints on current models possible
- Future: **IceCube**