

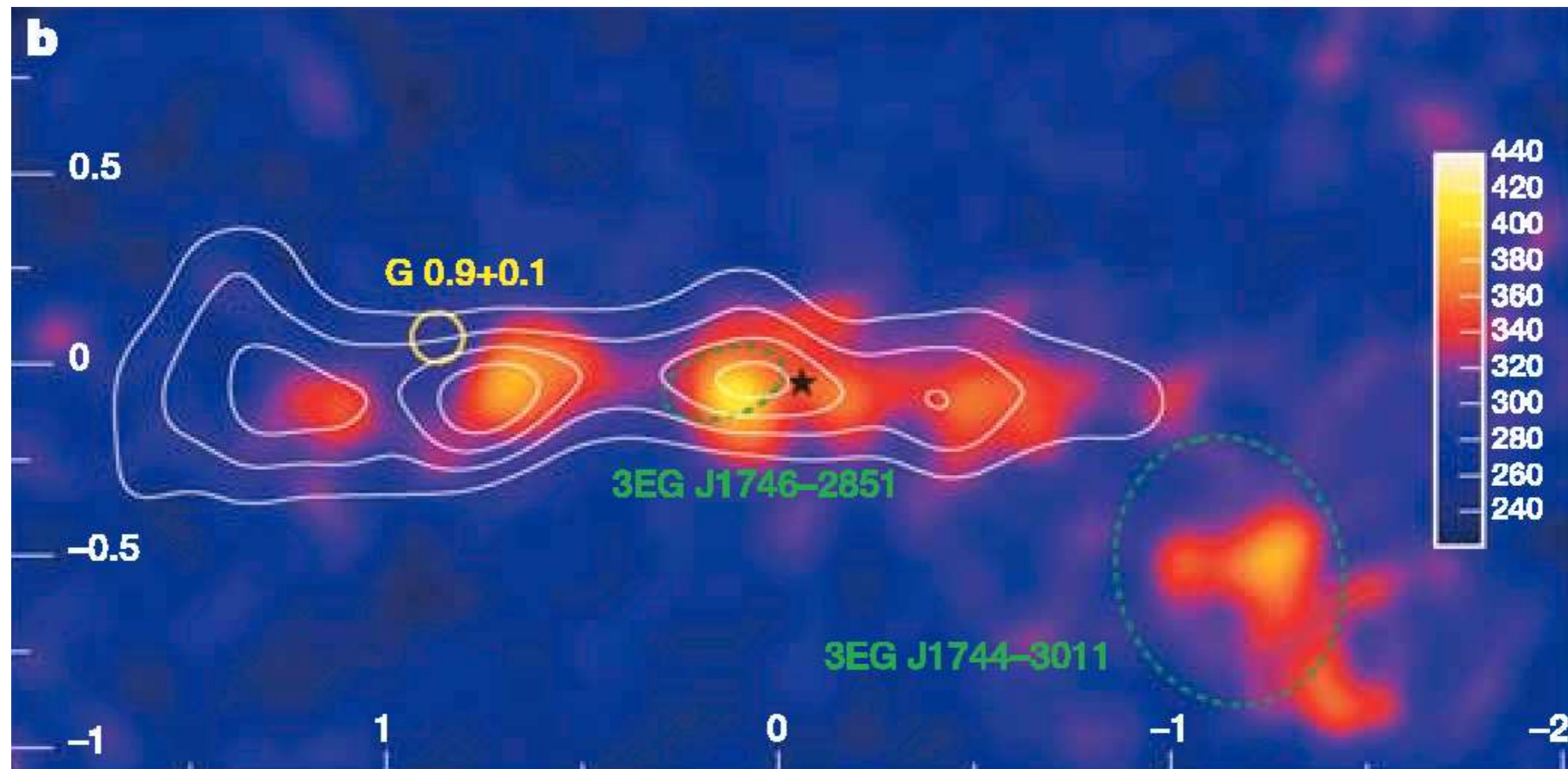
The future of ground-based gamma-ray astronomy

Diffuse galactic gamma-rays and shell-type supernova remnants

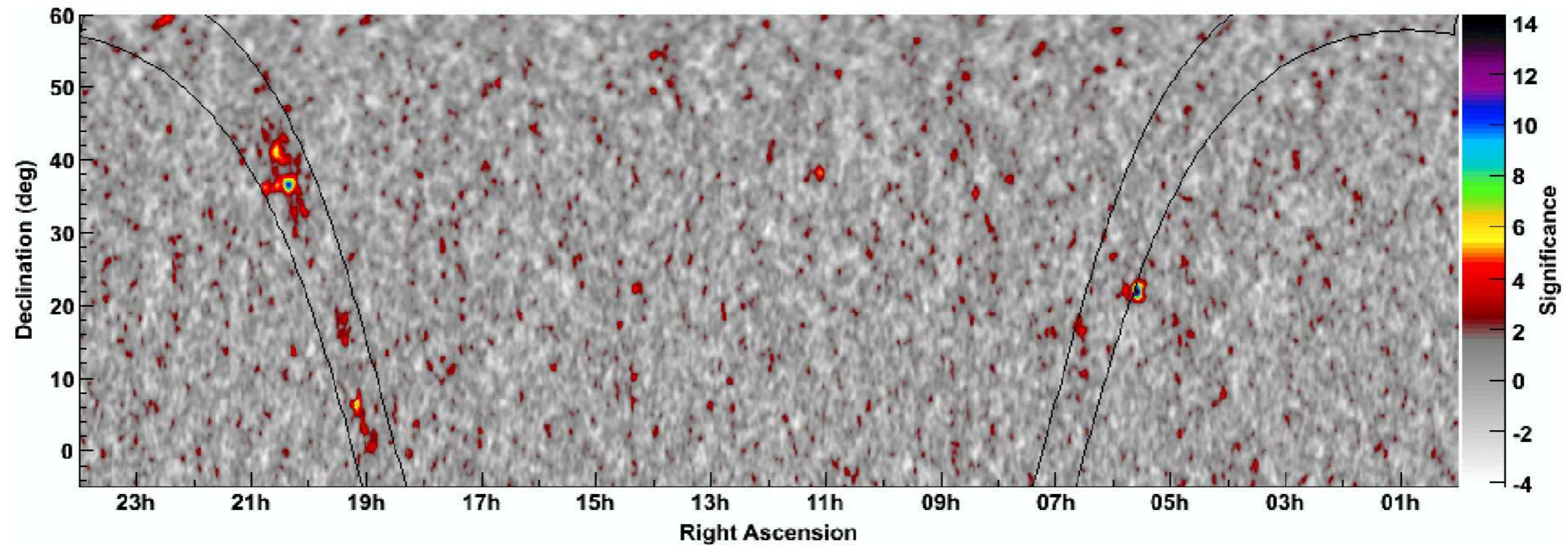
Martin Pohl

On behalf of the SNR/CR working group (about 15 members)

Detections of diffuse emission: 0.18 Crab/sqdeg near GC



HESS gamma-ray count map after subtraction of two bright point sources. The white contour lines indicate the column density of molecular gas traced by CS line emission.



Milagro: 70 Crab/sr at 12 TeV (21 mCrab/sqdeg)

14 new HESS sources in sky survey of inner Galaxy:

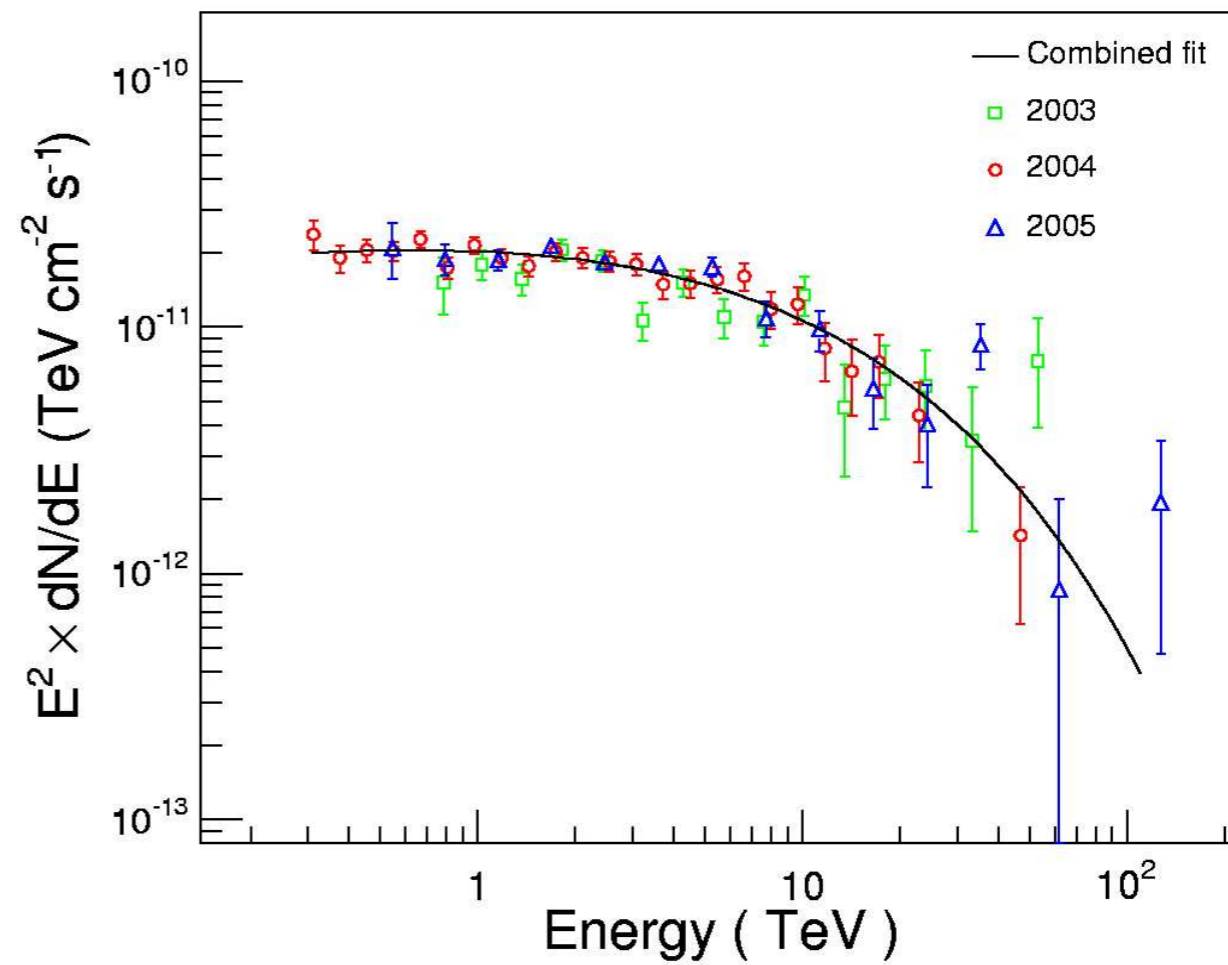
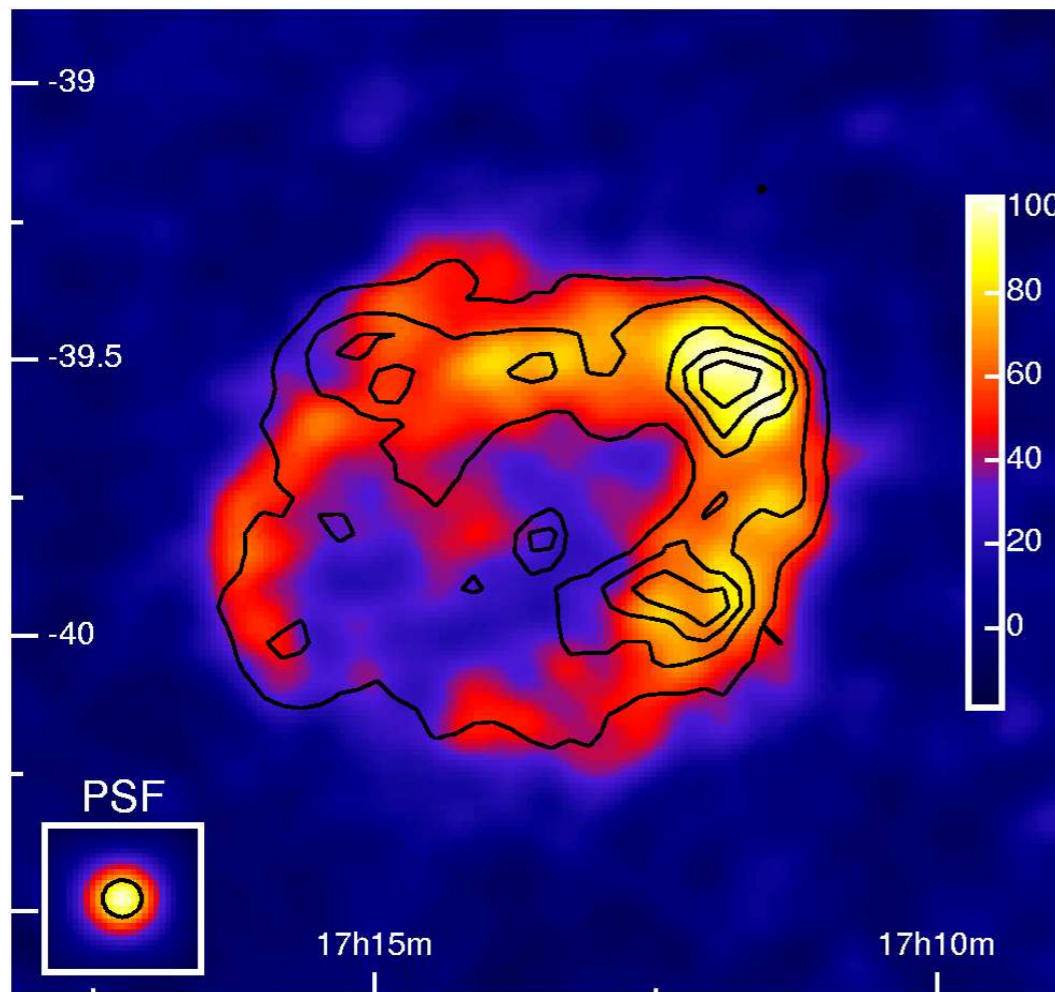
extrapolate: 140 Crab/sr at 12 TeV!

add old sources: GC, RX 1713, etc.

Significant fraction of Milagro intensity is probably sources!

Supernova remnants: RX J1713-3946

Fantastic HESS results



Important questions

Diffuse emission:

- What is the origin of cosmic rays above the knee at 3 PeV?
- Is the knee a propagation effect?

observe a location-dependent knee in diffuse emission

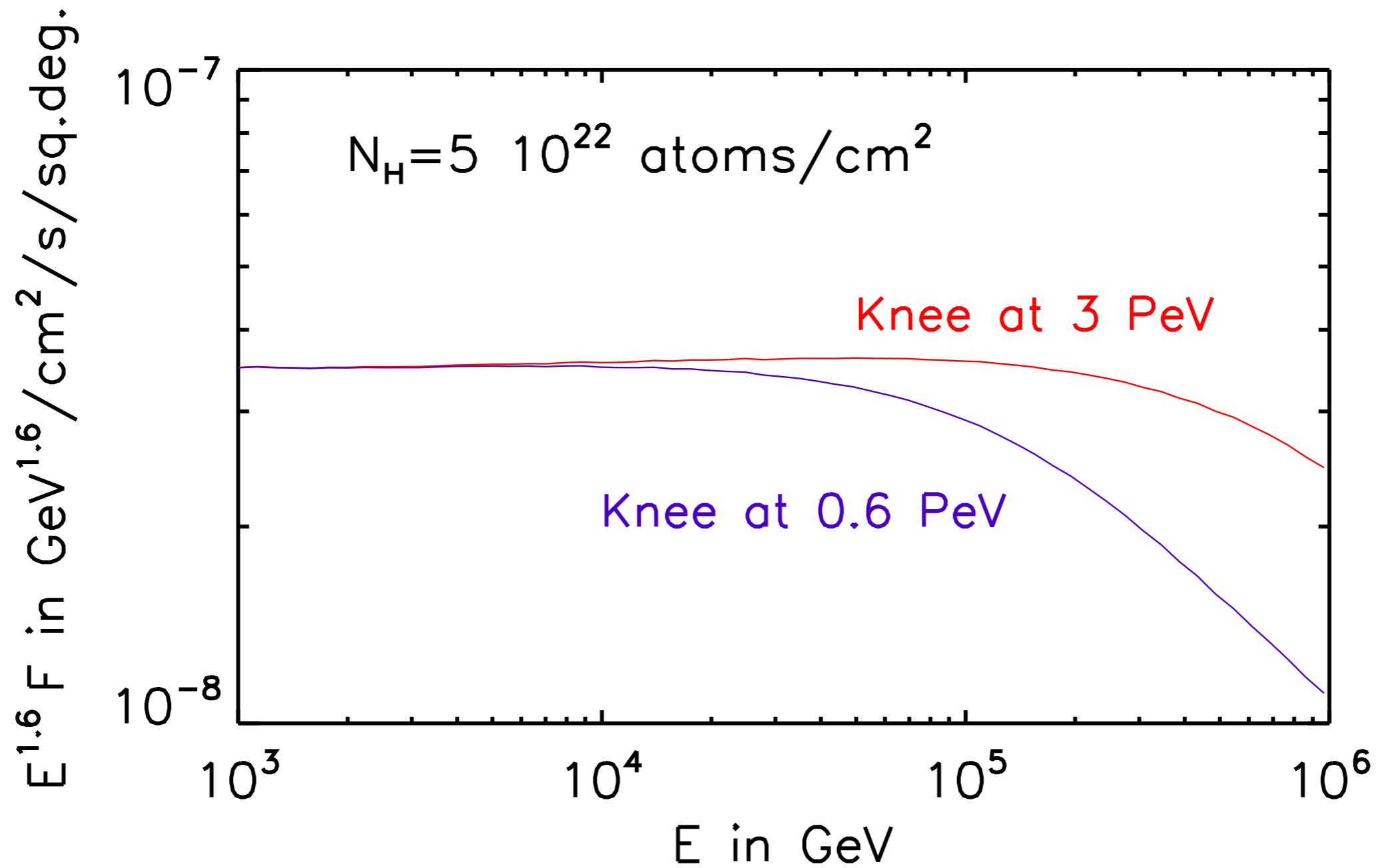
- What is the distribution of cosmic-ray electrons at energies beyond a few TeV?

direct information on the particle acceleration rate

properties of cosmic rays up to the knee

- What is the dark-matter contribution to the diffuse emission?

The signature of the knee in diffuse gamma rays



Important questions

Diffuse emission:

- What is the origin of cosmic rays above the knee at 3 PeV?
- Is the knee a propagation effect?

observe a location-dependent knee in diffuse emission

- What is the distribution of cosmic-ray electrons at energies beyond a few TeV?

direct information on the particle acceleration rate

properties of cosmic rays up to the knee

- What is the dark-matter contribution to the diffuse emission?

Supernova remnants:

- Do they produce cosmic-ray ions up to the knee?
 - must separate leptonic and hadronic emission
 - observe neutrinos?
- How exactly are the particles accelerated?
 - high angular-resolution spectroscopy
- With what efficiency are magnetic fields generated at SNR shocks?
 - slides by Don Ellison
- What are the bright extended TeV γ -ray sources found with HESS?

Performance requirements

Field-of-view:

Uncritical as long as larger than structures of interest

Energy threshold:

no gap to GLAST range ($\lesssim 100$ GeV)

Upper energy limit:

up to pair-production limit ($\gtrsim 300$ TeV)?

Angular resolution:

model and subtract sources
relate to X-ray structure (filaments etc.)
avoid source confusion

Sensitivity:

10 x HESS?