

SPECTRUM

COMPOSITION

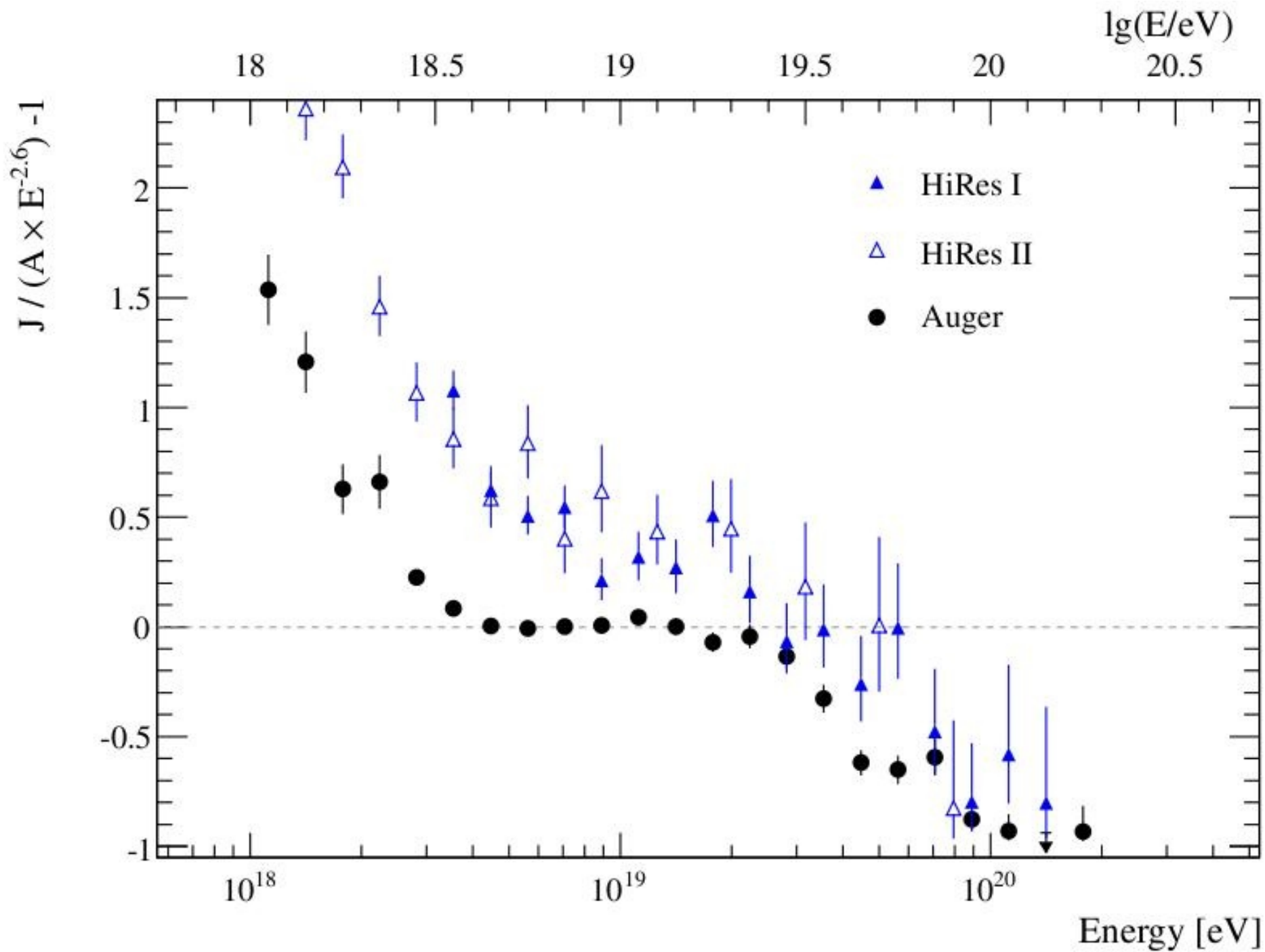
ANISOTROPIES

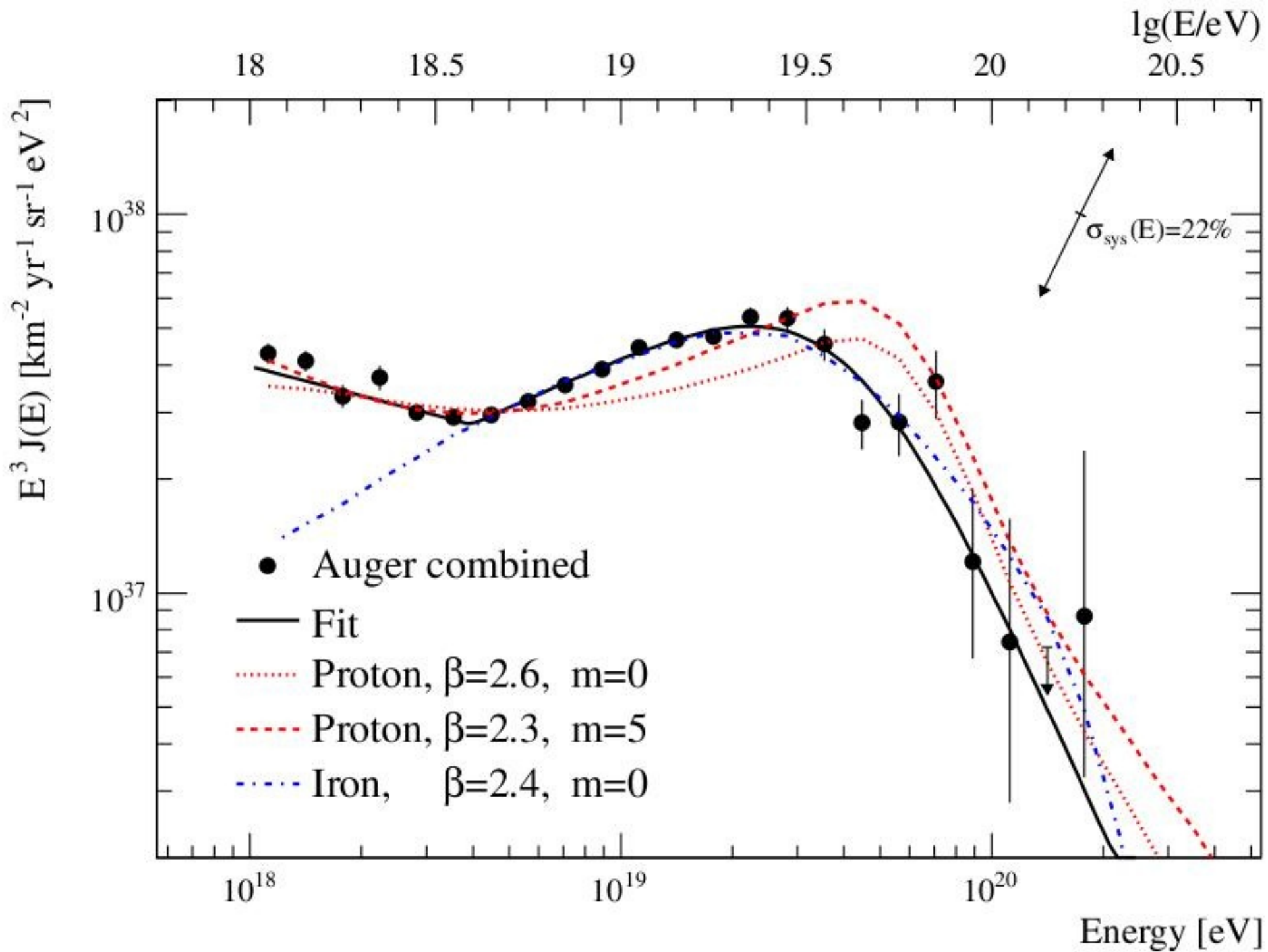
SPECTRUM

OK !

Absolute energy scale?

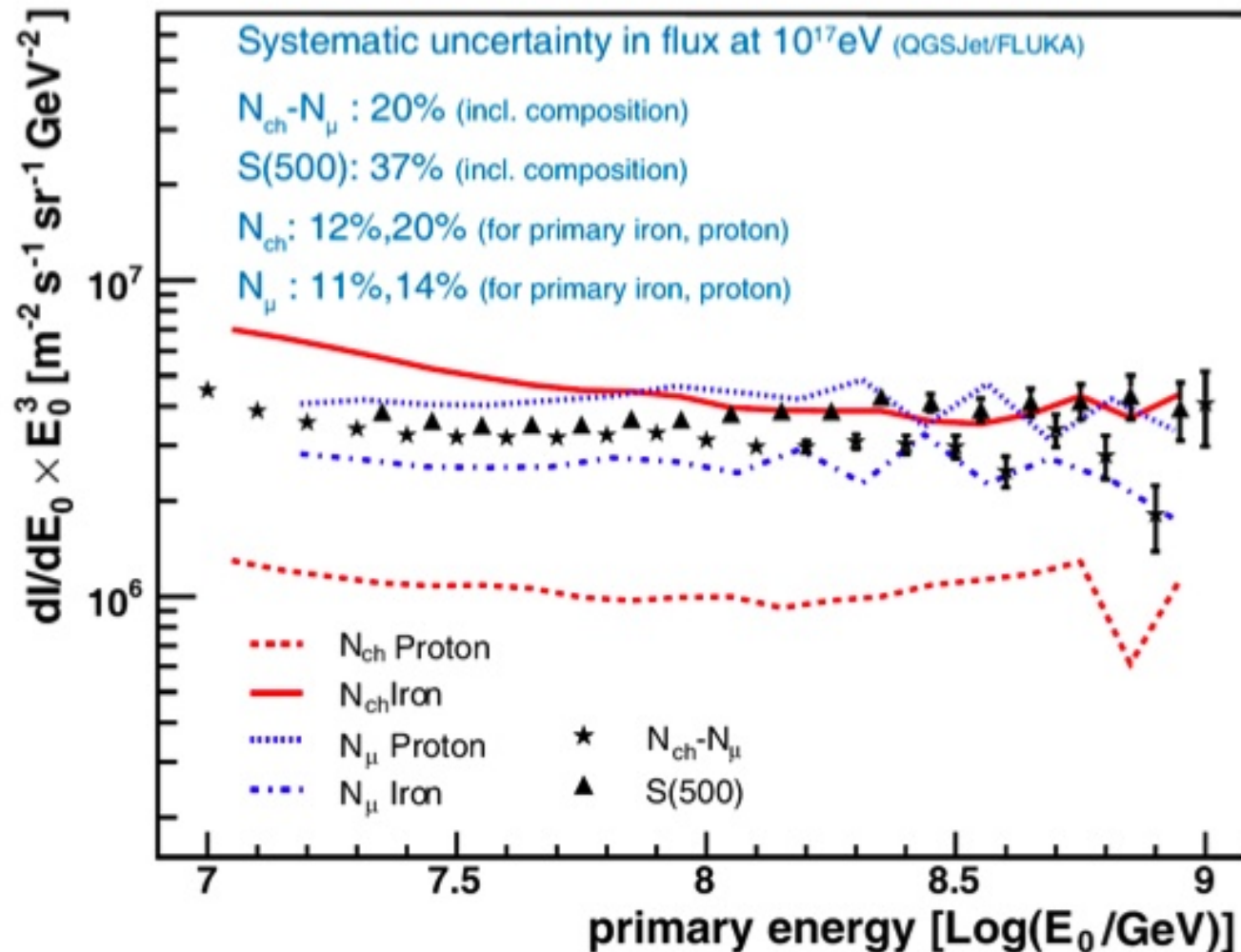
2nd Knee ?





KASCADE-Grande

Reconstruction of the energy spectrum



- Differences due to different sensibility to composition?

COMPOSITION

???

conflicting data?

Xmax

Fluctuations

Other methods

Elongation rate corrected for detector acceptance and comparison with previous results

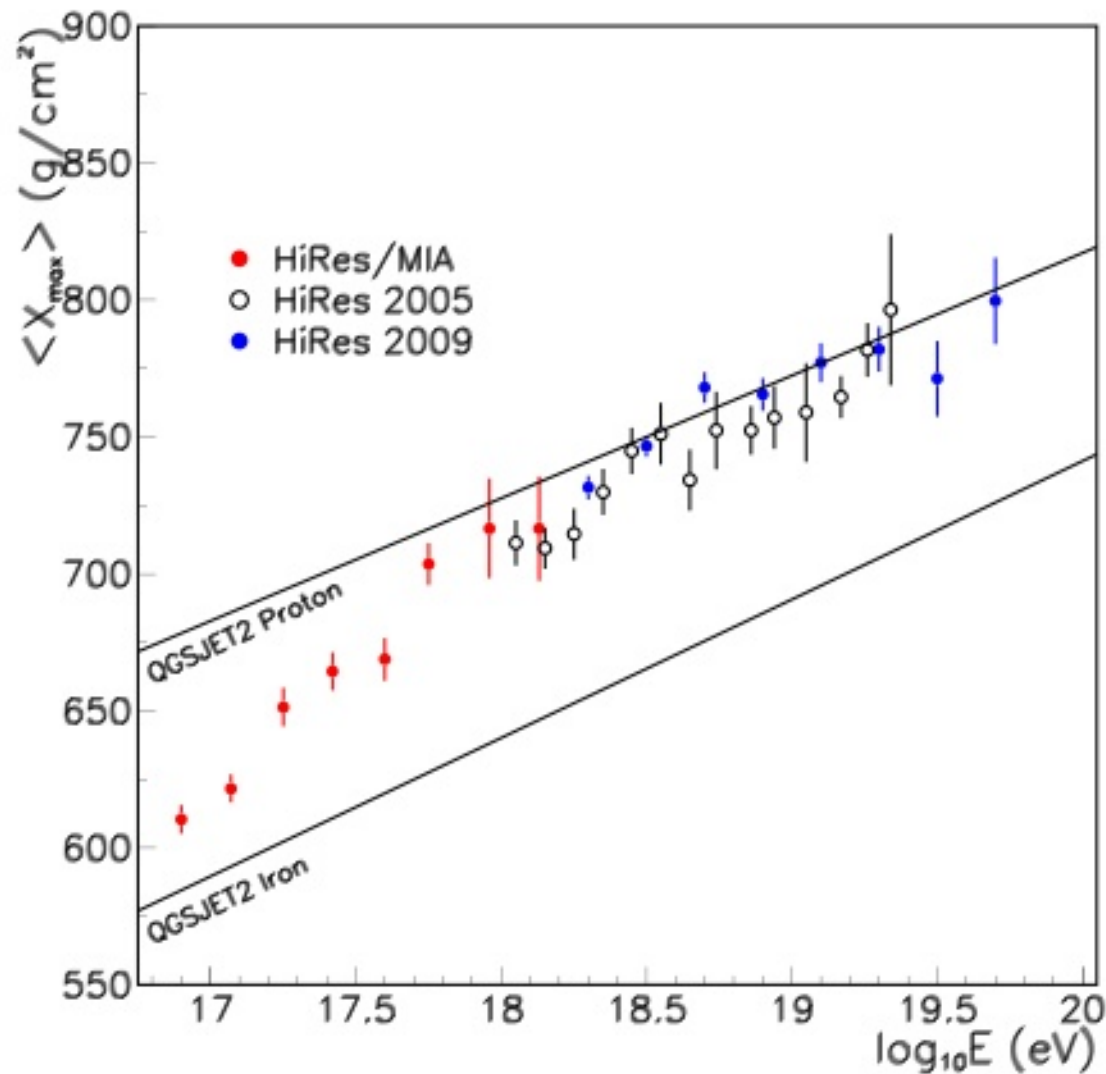
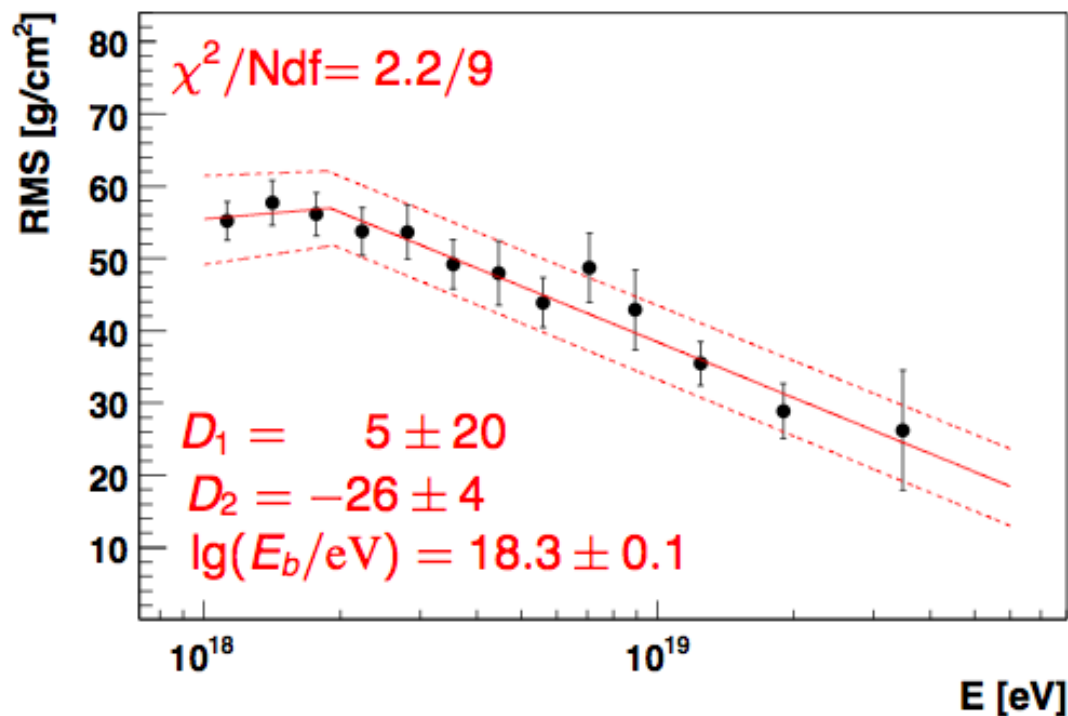
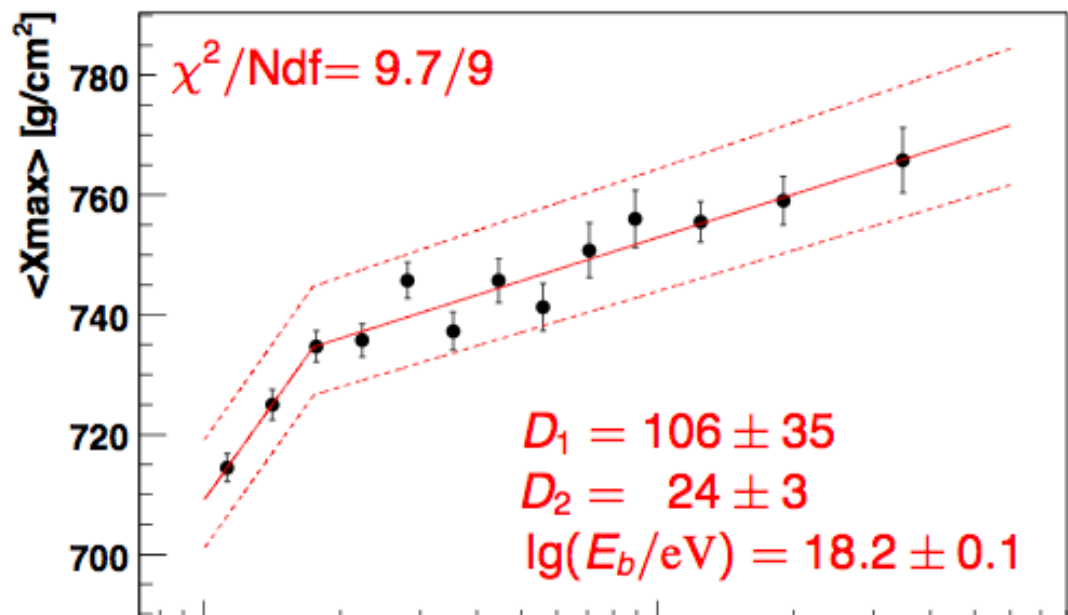


Fig. 25.— Comparison of current HiRes stereo $\langle X_{\text{max}} \rangle$ results with results from the HiRes-prototype/MIA hybrid (Abu-Zayyad et al. 2001) and previously published HiRes stereo results (Abbasi et al. 2005).

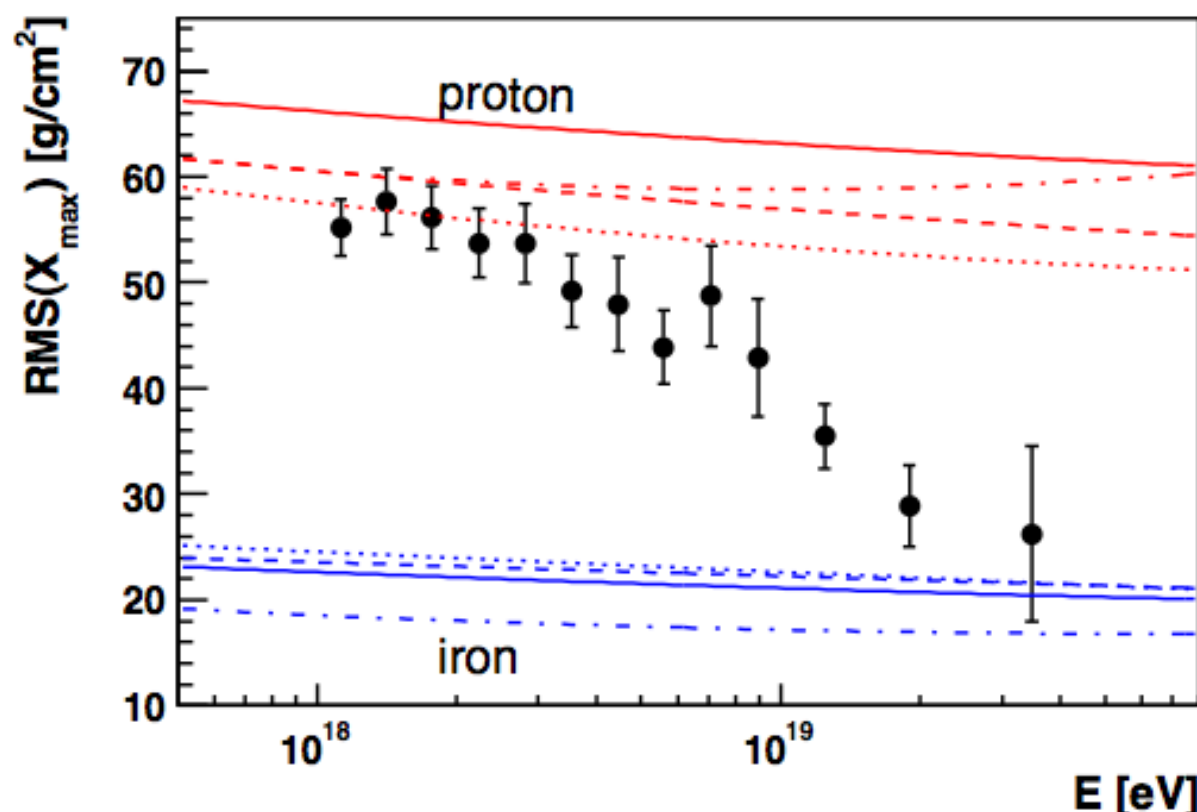
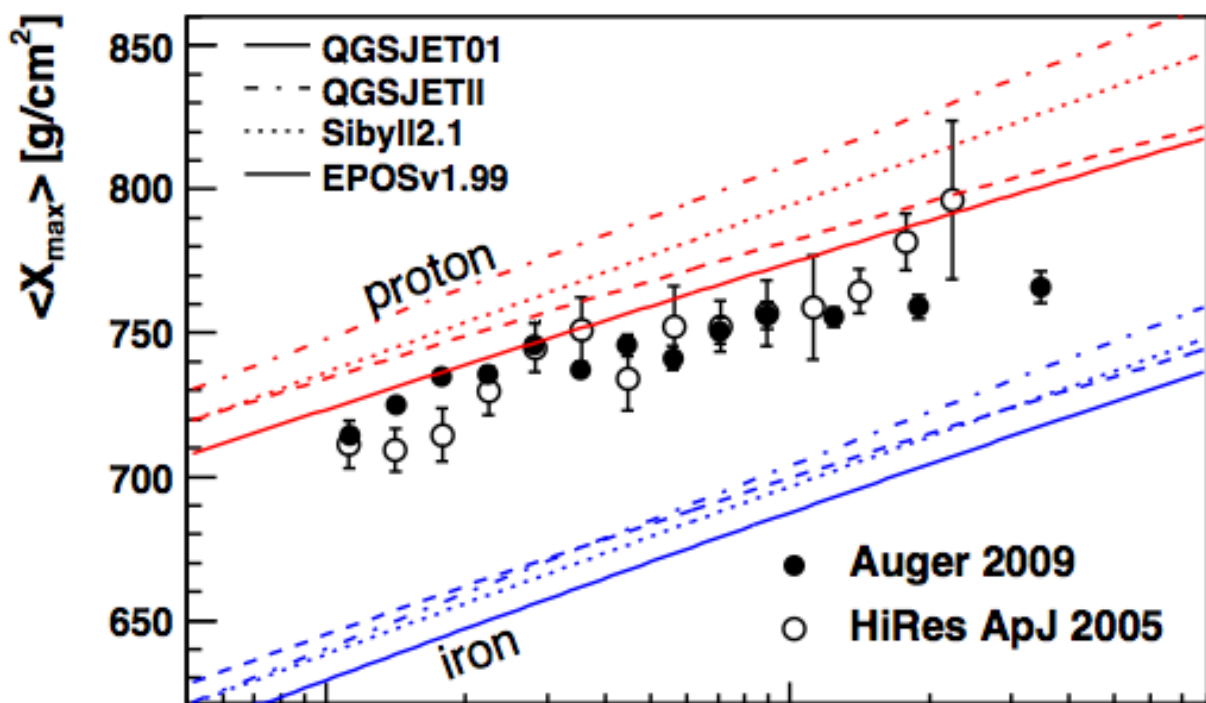
FD Results

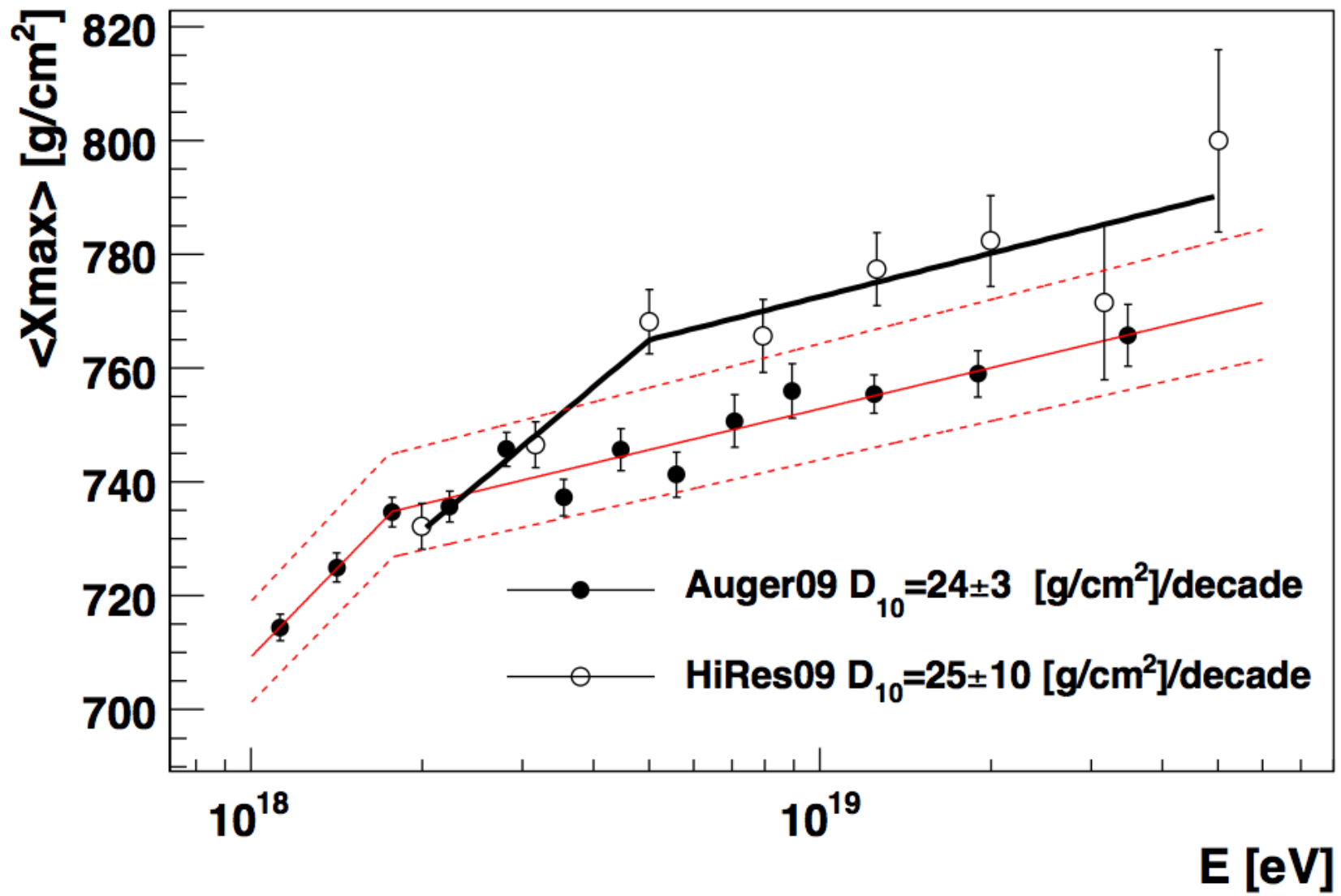
- ▶ $\langle X_{\max} \rangle$ and RMS vs E
- ▶ resolution correction
- ▶ broken line fit:
slopes D [$\text{g}/\text{cm}^2/\text{decade}$]
- ▶ comparison to air shower simulations
- ▶ published HiRes data
(update cf. Pierre's talk)



FD Results

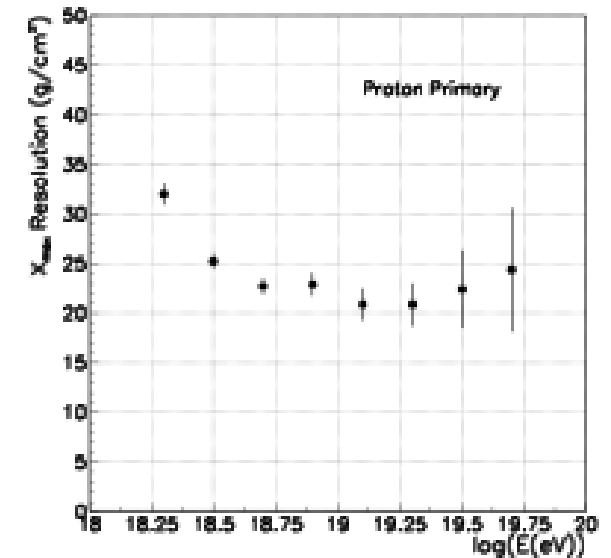
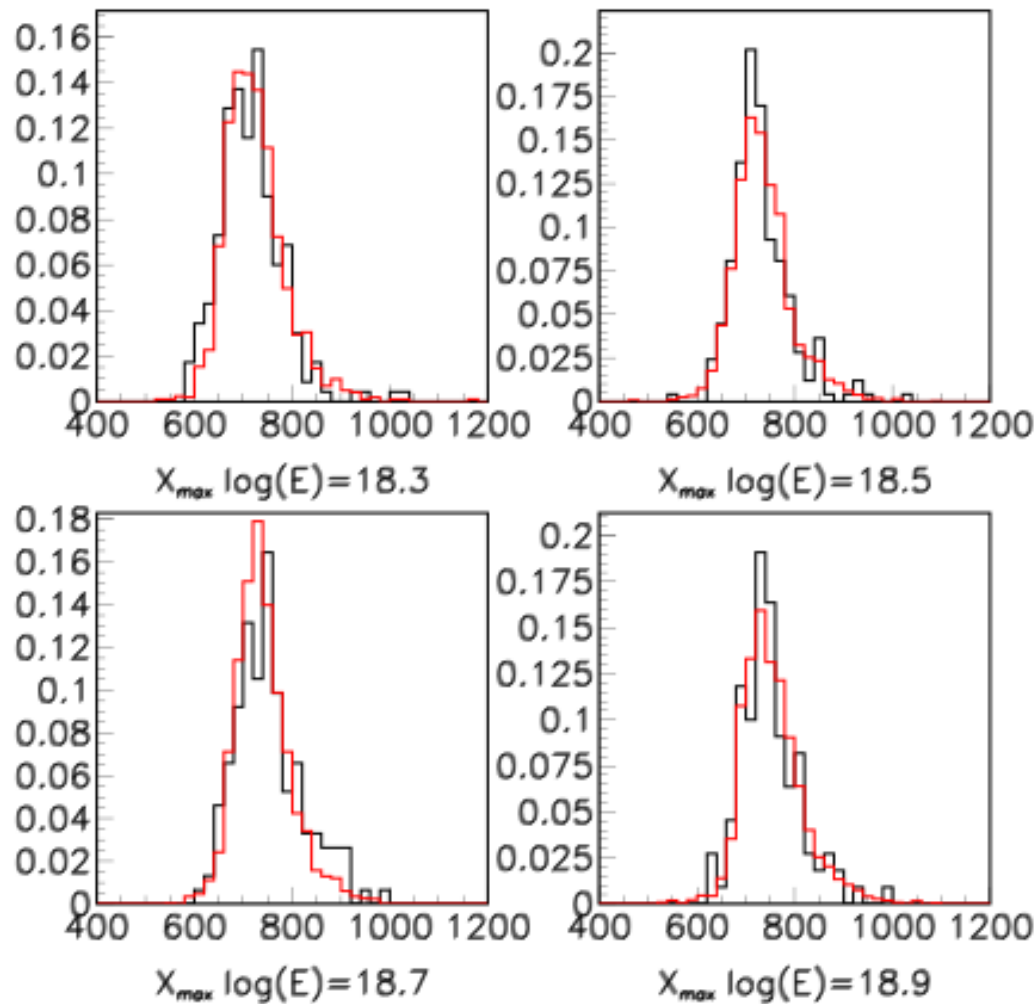
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From Michael Unger (in real time !)

Xmax fluctuations data and p QGSJET02



Xmax resolution

Fig. 26.— Overlays of HiRes stereo data X_{max} (black) and QGSJET2 proton Monte Carlo (red) for successive energy bins.

Comparison of data and p-QGSJET02 fluctuation widths
Use 2-sigma truncated gaussian width to fit X_{max} distr.
Detector resolution is NOT deconvoluted!

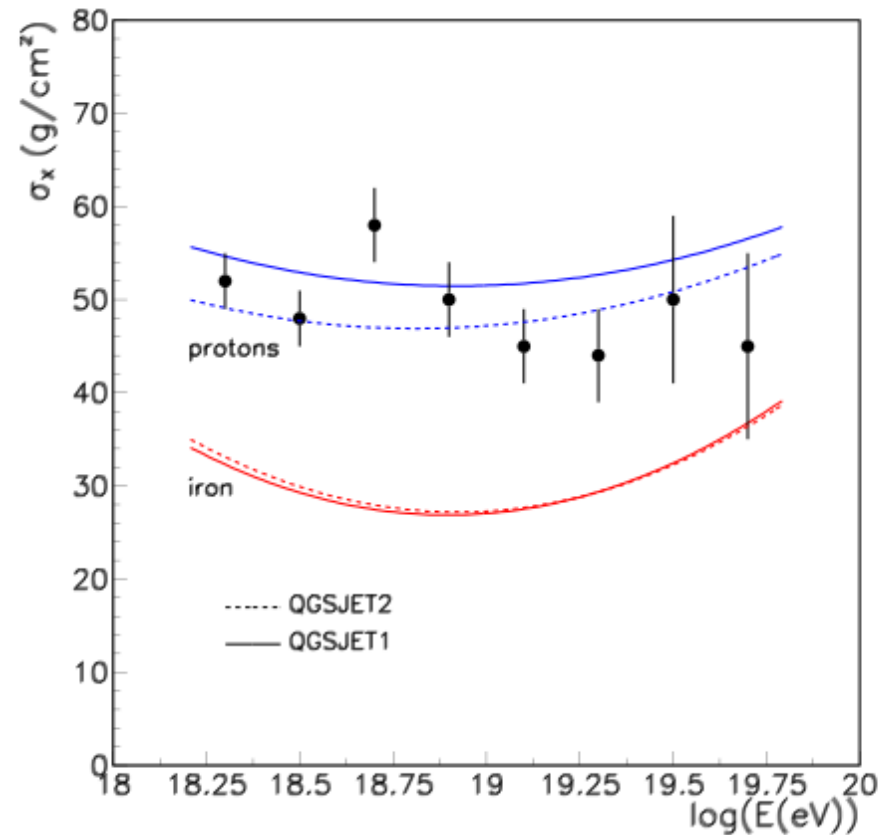


Fig. 28.— Results of fitting HiRes stereo data X_{max} distribution to Gaussian truncated at $2 \times \text{RMS}$ (black points). Superimposed are curves representing expectations based on QGSJET1 and QGSJET2 proton and iron Monte Carlo. Gaussian-in-age parametrization used in reconstruction.

Overall comparison of X_{max} data with QGSJET02 p and FE

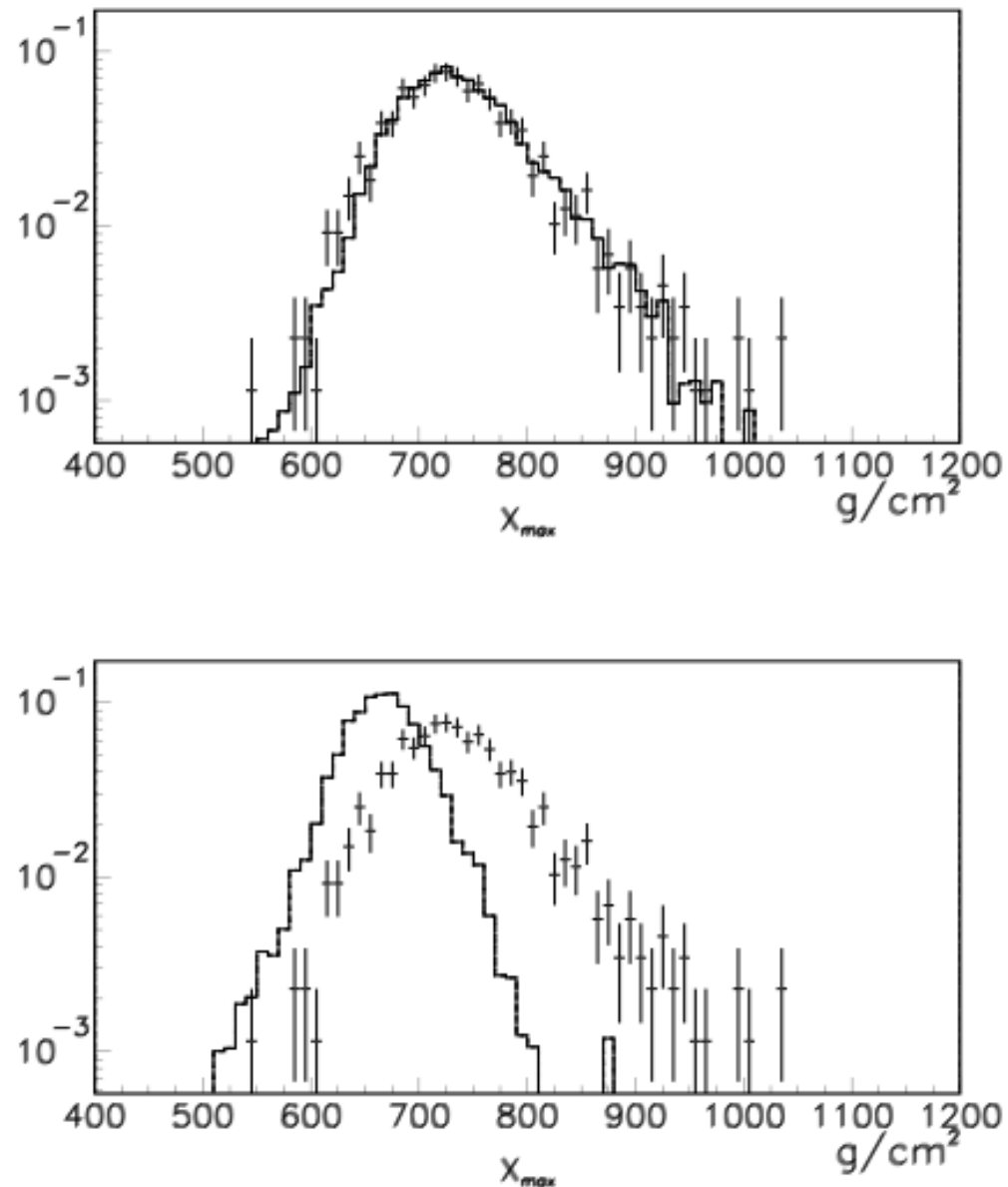


Fig. 11.— *Top*: X_{max} overlay of HiRes data (points) with QGSJET02 proton Monte Carlo airshowers after full detector simulation. *Bottom*: X_{max} overlay of HiRes data (points) with QGSJET02 iron Monte Carlo airshowers after full detector simulation.

ANISOTROPIES

???

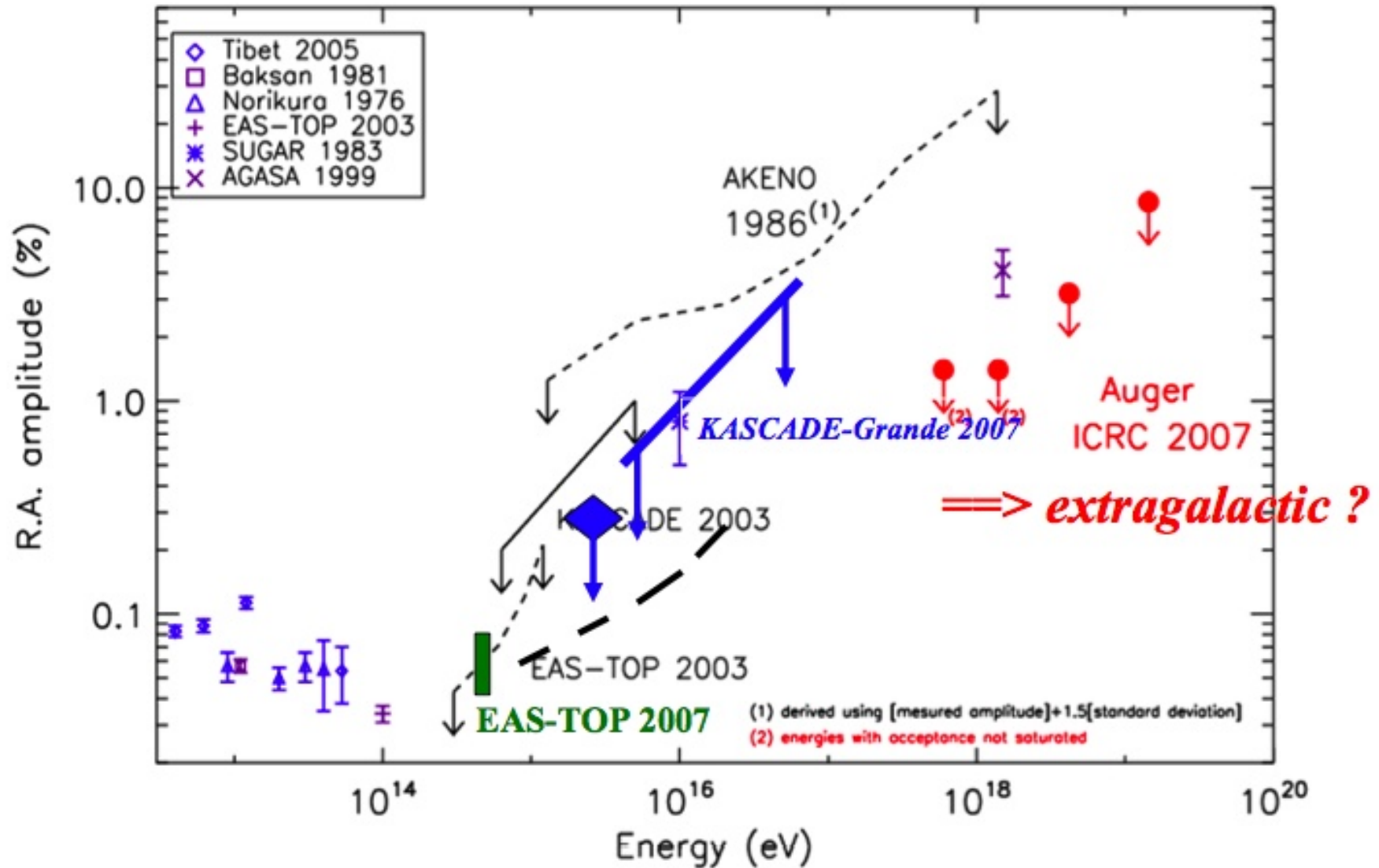
Large Scale

(Galactic - Extragalactic)

SMALL scale

(Source identification)

Anisotropy

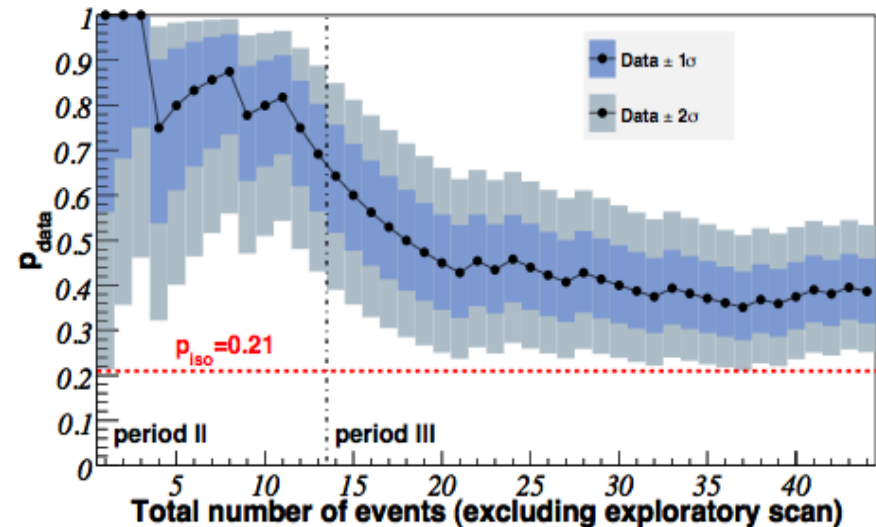
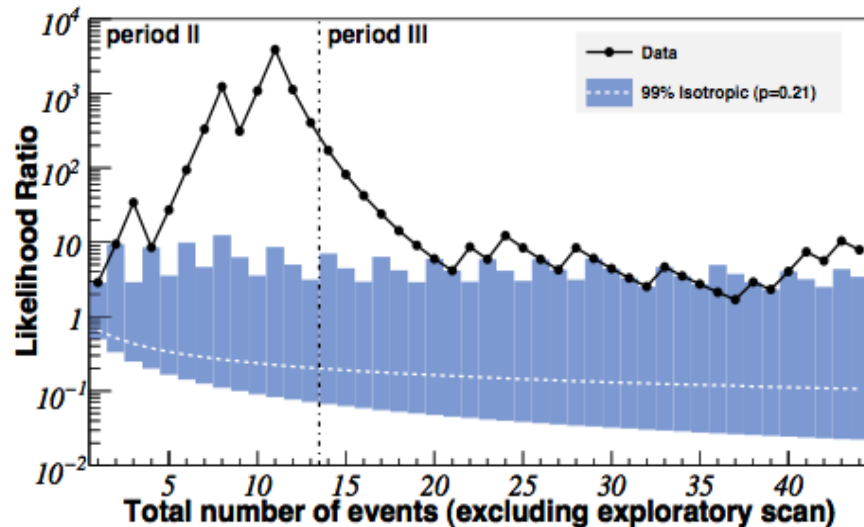


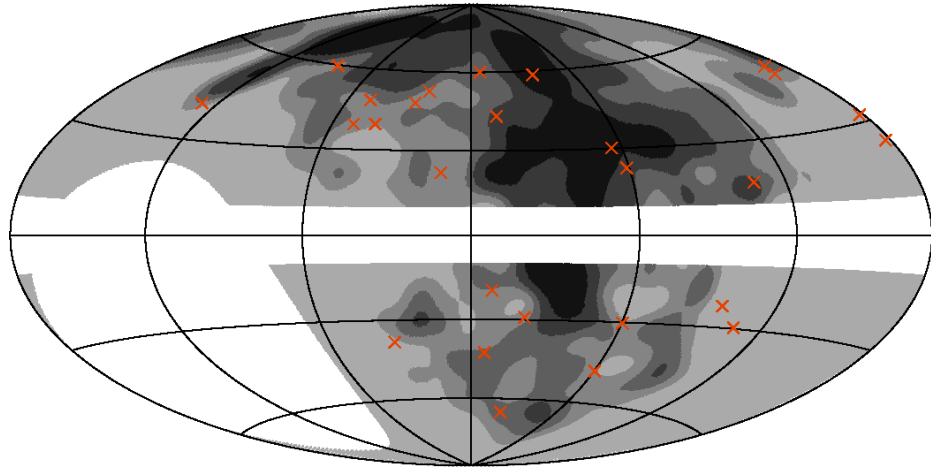
Michael Hillas

“Suspend disbelief”
(very strong evidence!)

Michael Hillas

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(very strong evidence!)

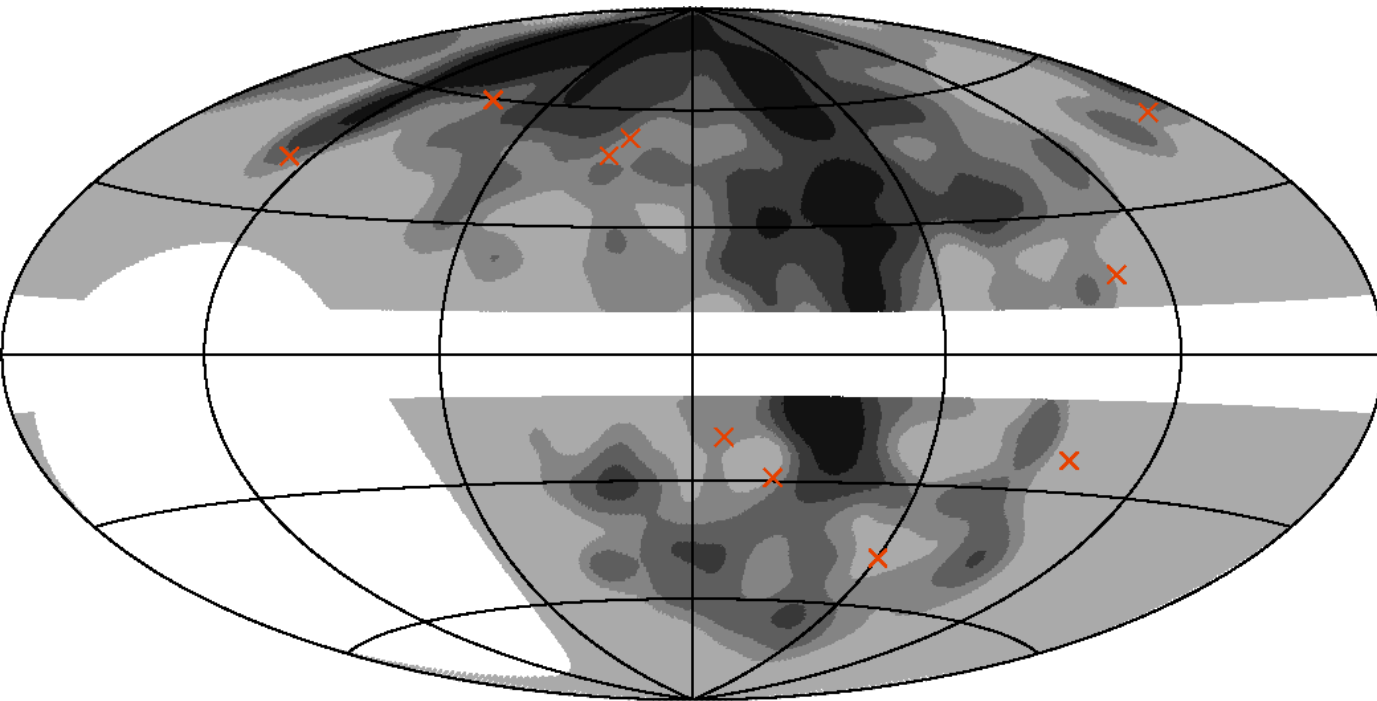




40 EeV

Sky Plots –data vs local
LSS matter density model
with HiRes aperture
6 degree smearing

Claim exclusion at 95% for
 $E > 40 \text{ EeV}$ with $\theta_s < 10^\circ$
(*Koers, Tyniakov,*
Thomson)



57 EeV

Pierre Sokolski

Conclusion_02

- No evidence of correlations with AGN's in Northern Sky
- No evidence of correlation with local LSS with smearing angles less than 10 degrees
- Heavy nuclei? No clear evidence in HiRes data – consistent with protons
- Large B fields?
- Telescope Array now taking data to increase statistics

Pierre Sokolski