A. van Vliet, R. Alves Batista, J. Hörandel. In preparation

▸ spectral index = 2.5

▸ maximal rigidity = 200 EV

▸ protons only
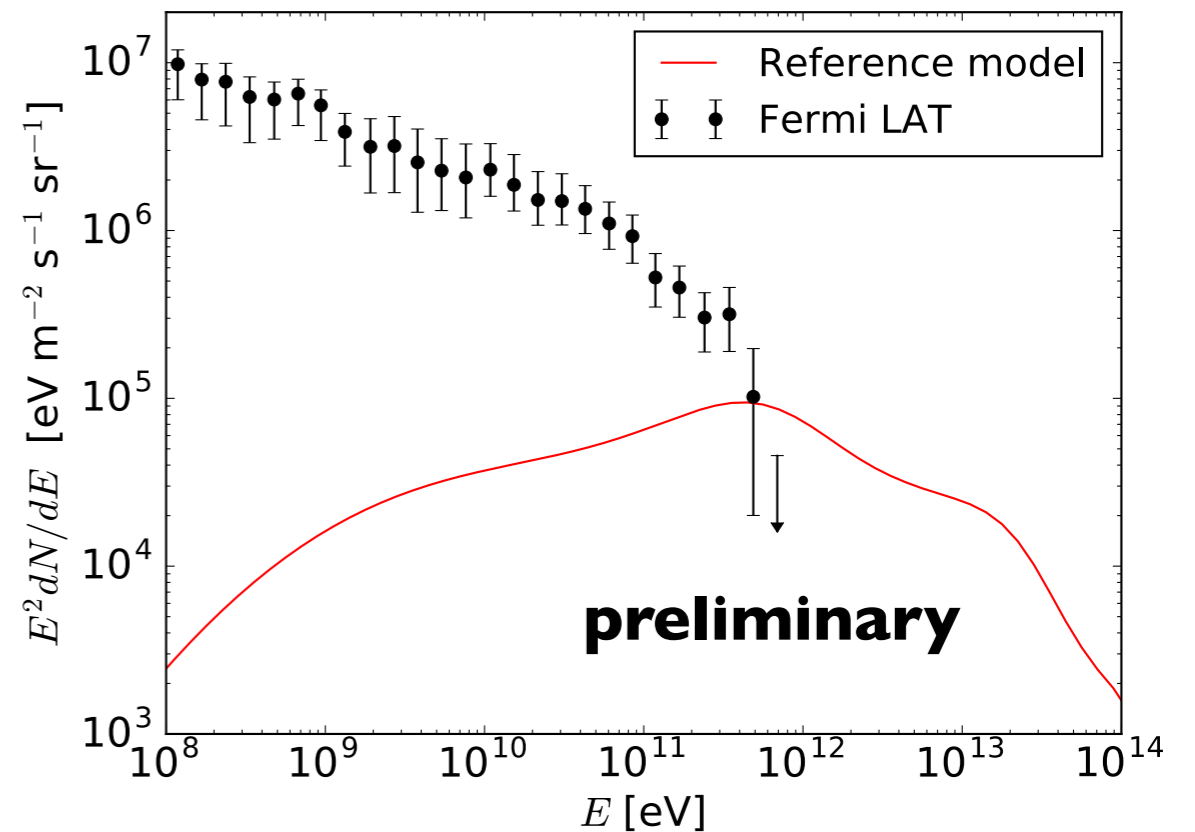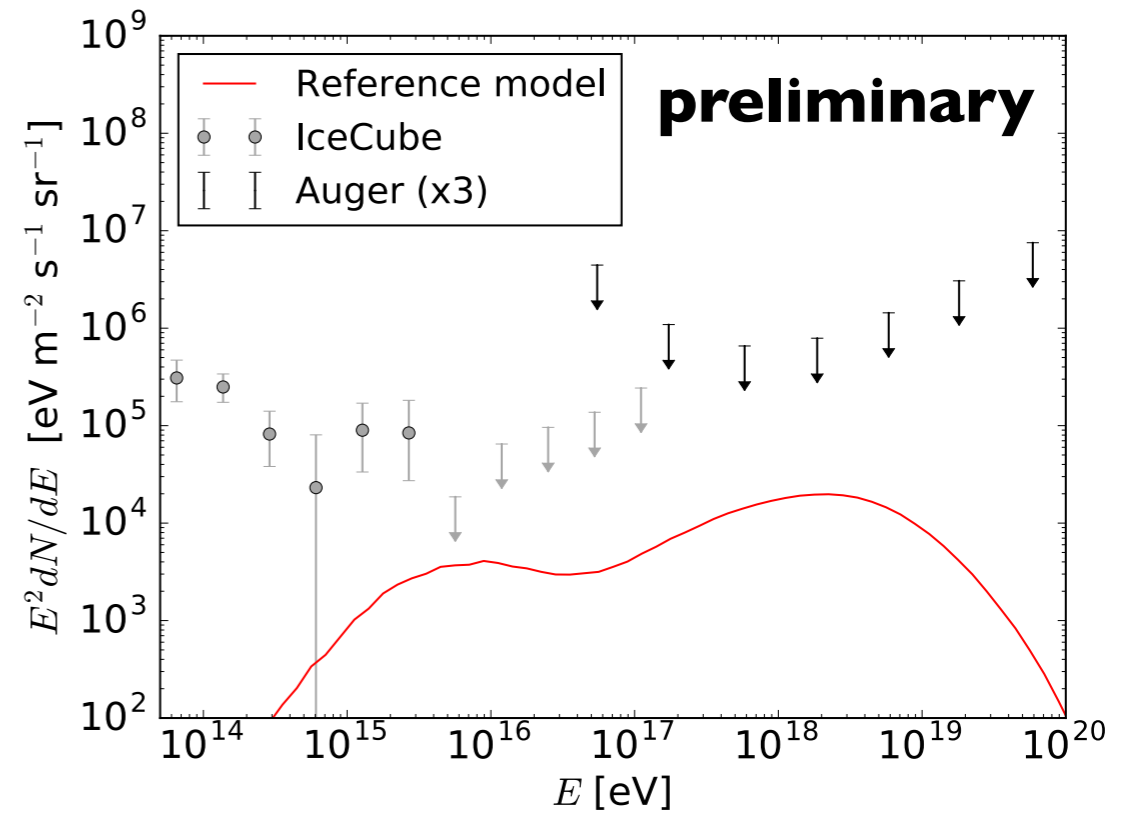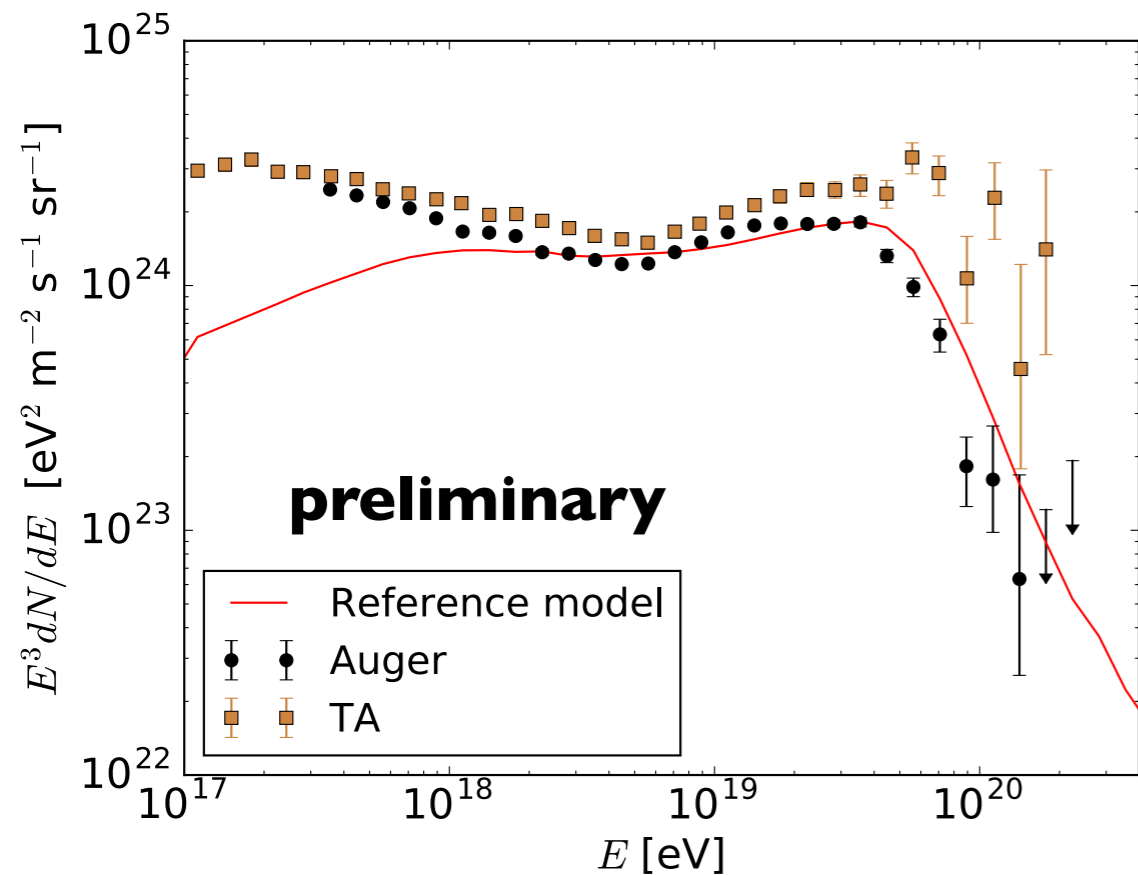
A. van Vliet, R. Alves Batista, J. Hörandel. In preparation

- spectral index = 2.5

- maximal rigidity = 200 EV

- protons only

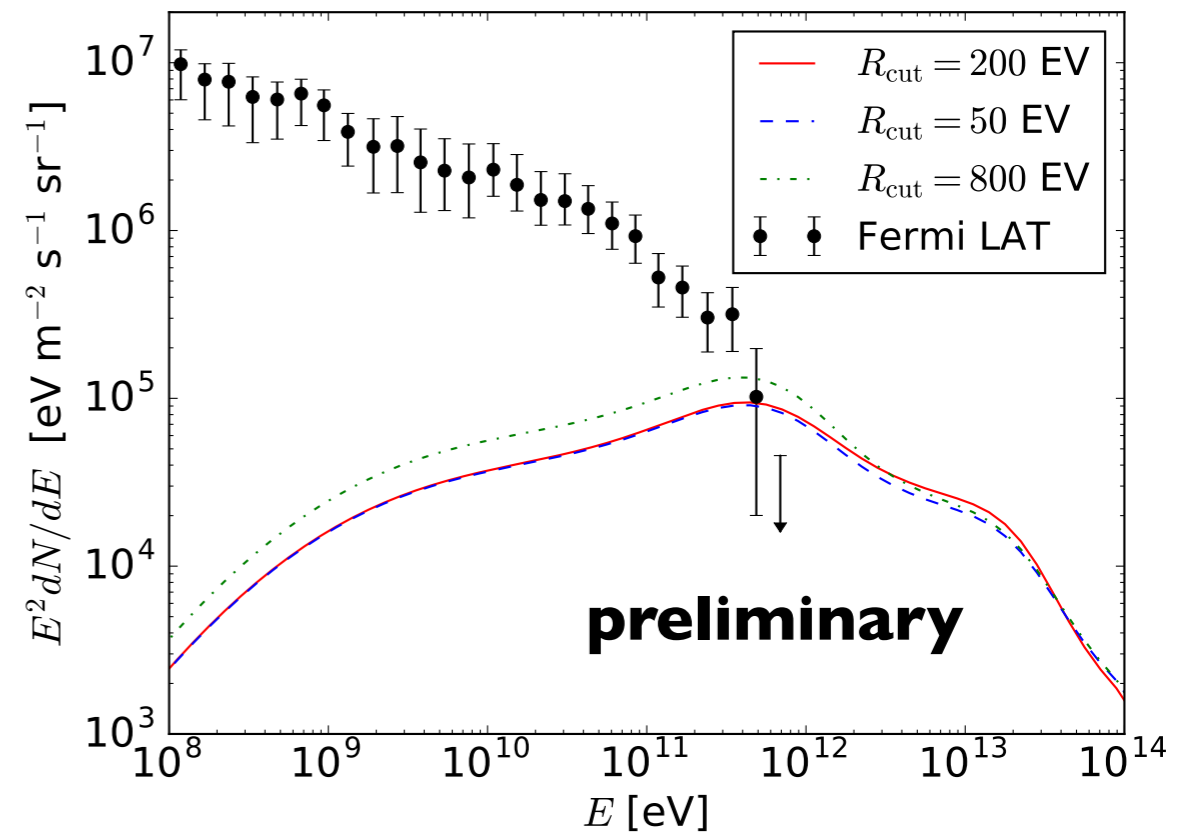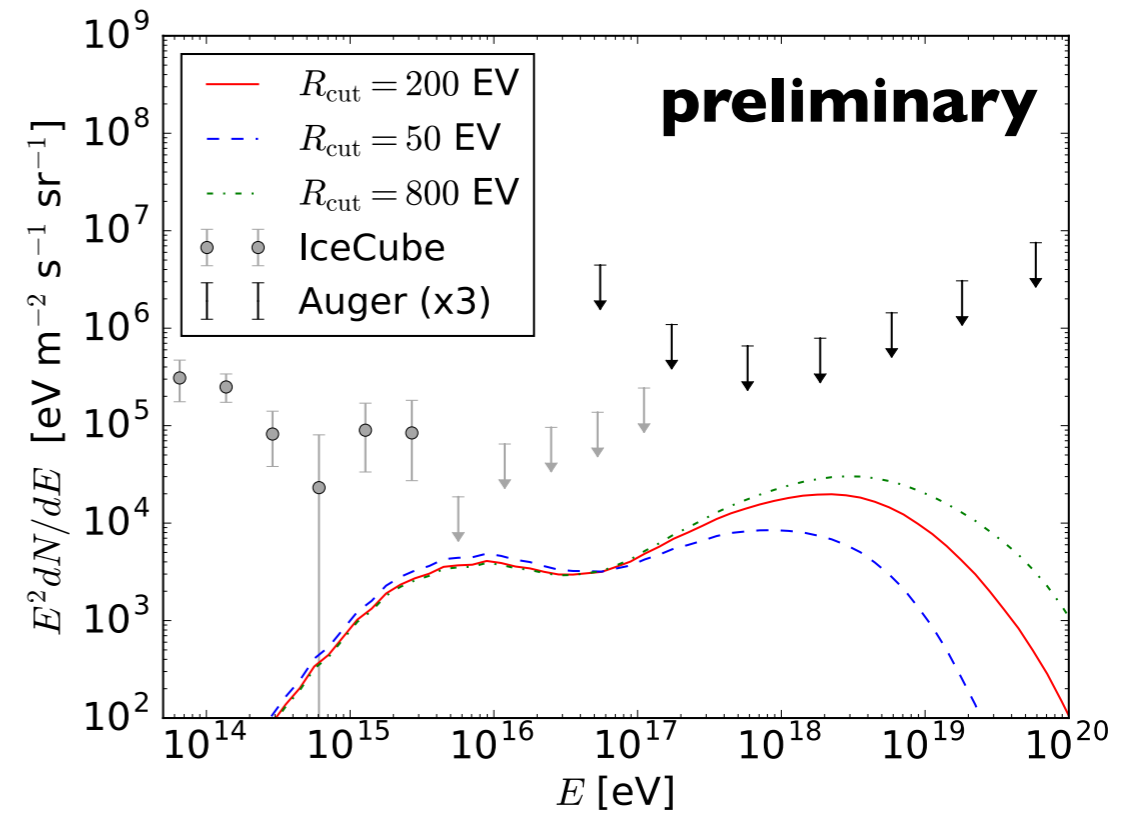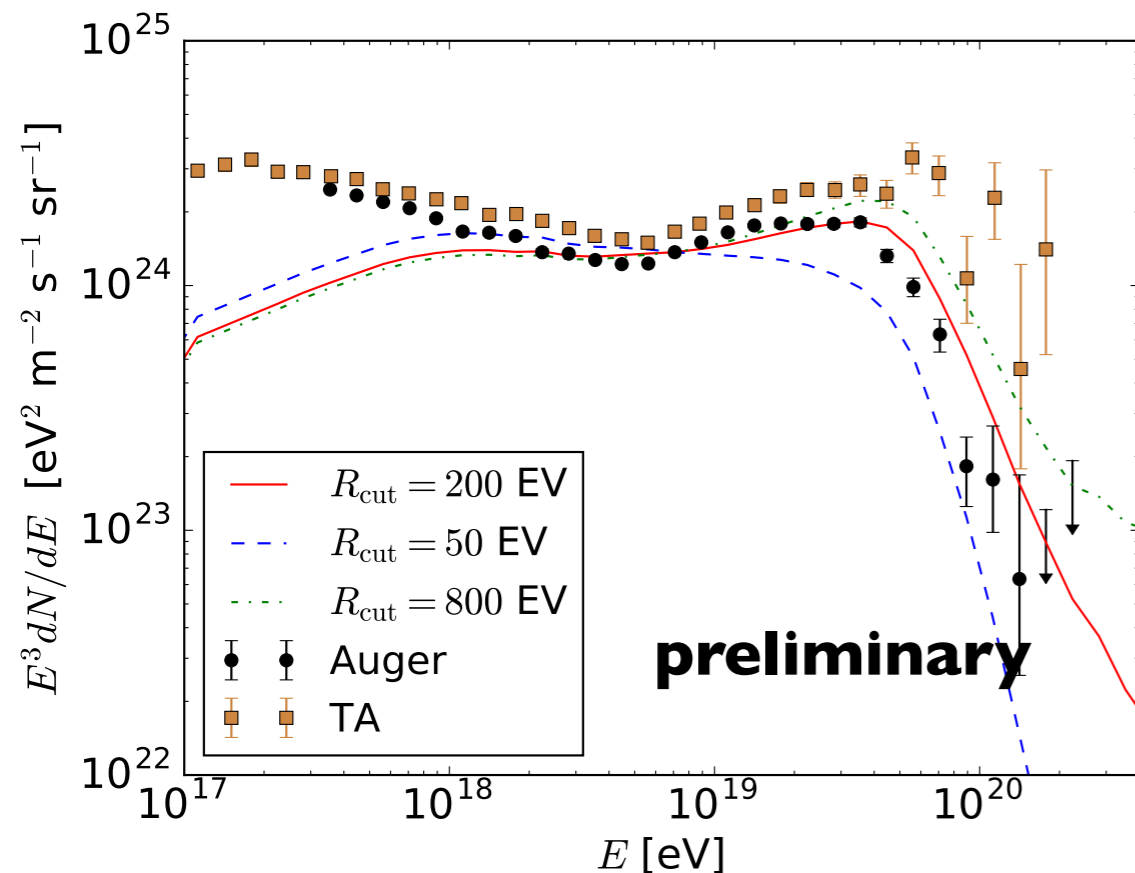A. van Vliet, R. Alves Batista, J. Hörandel. In preparation

- spectral index = 2.5

- maximal rigidity = 200 EV

- protons only

A. van Vliet, R. Alves Batista, J. Hörandel. In preparation

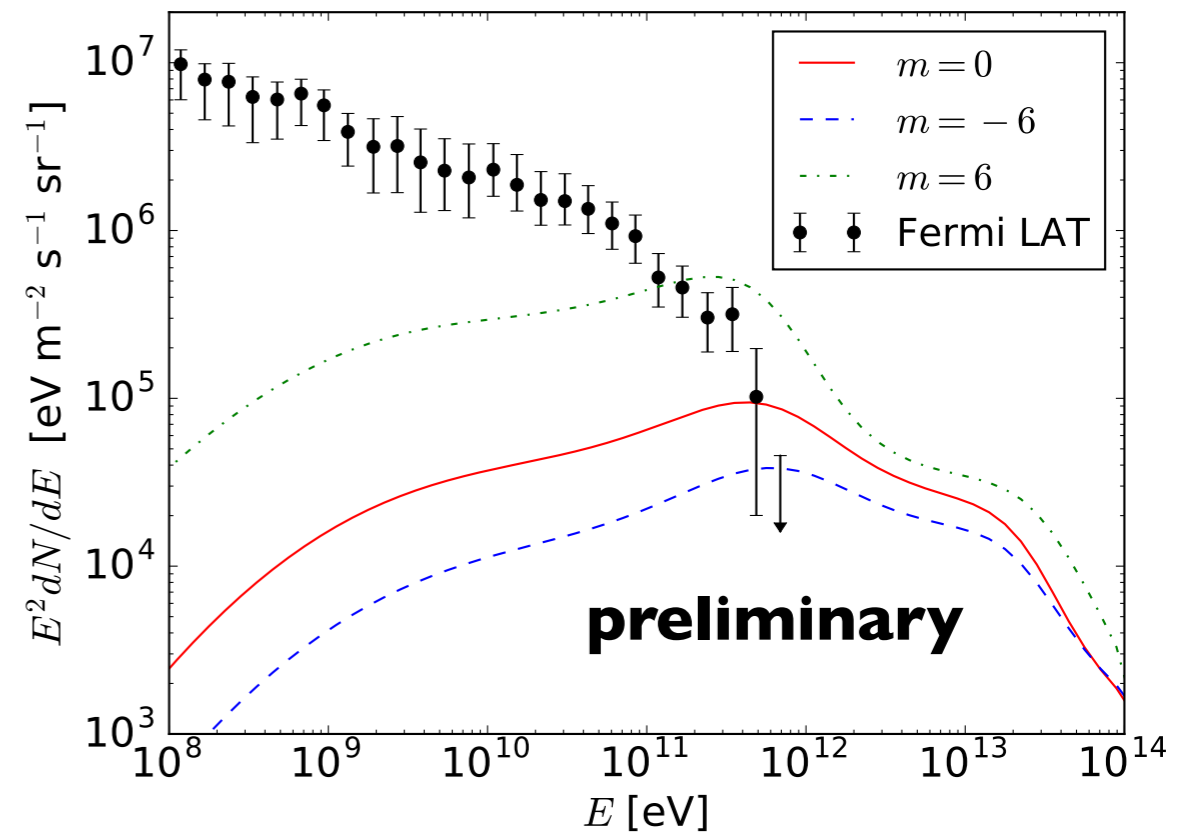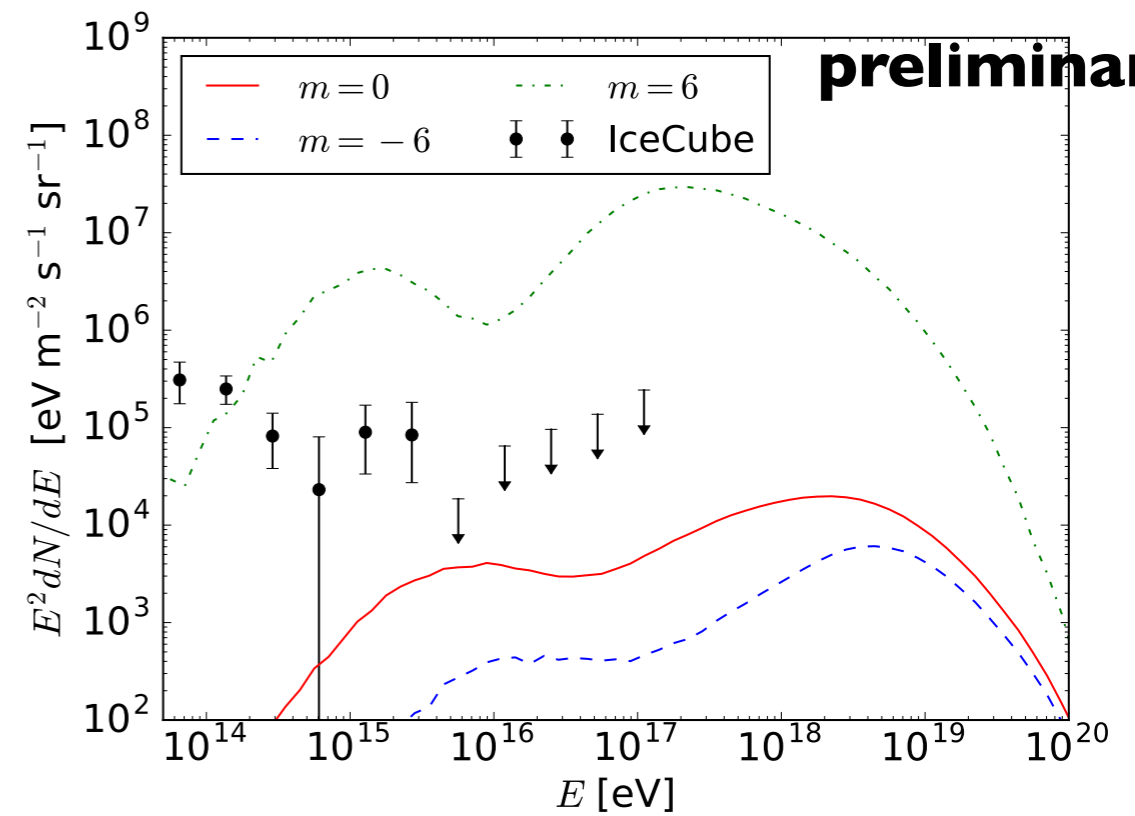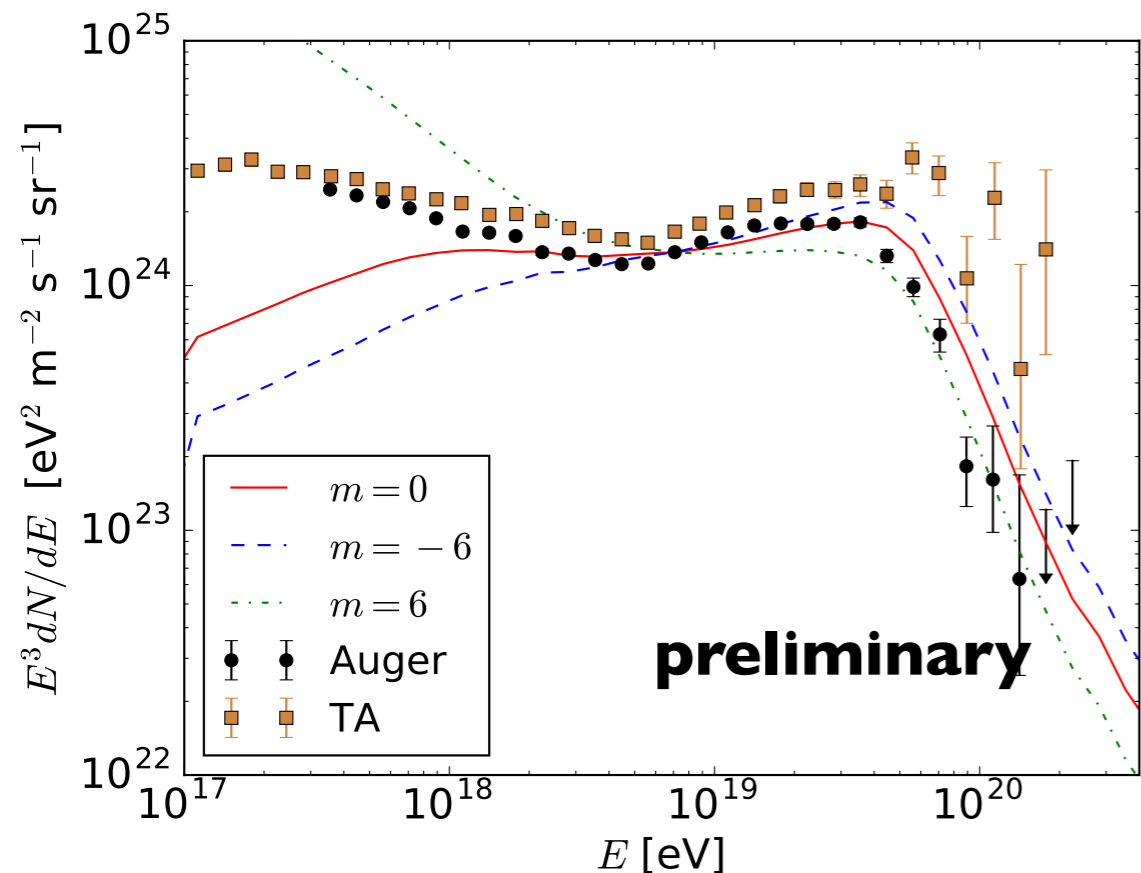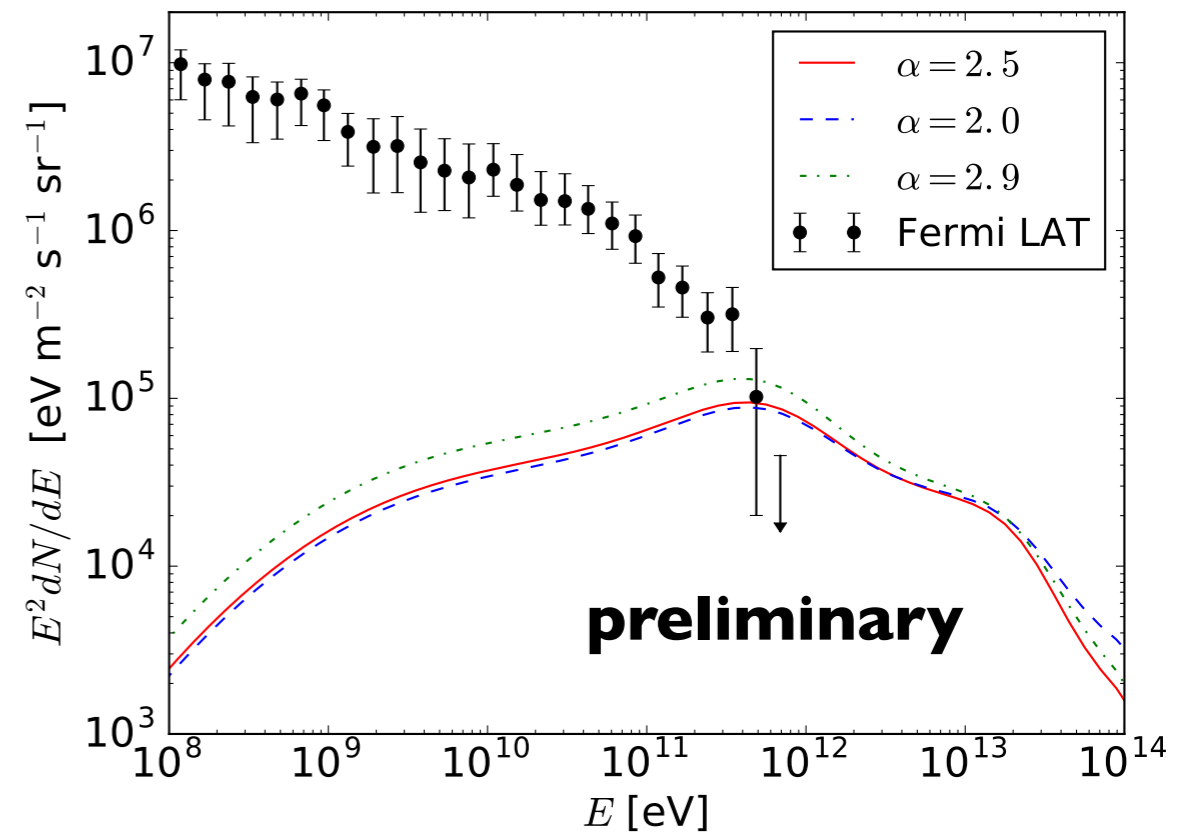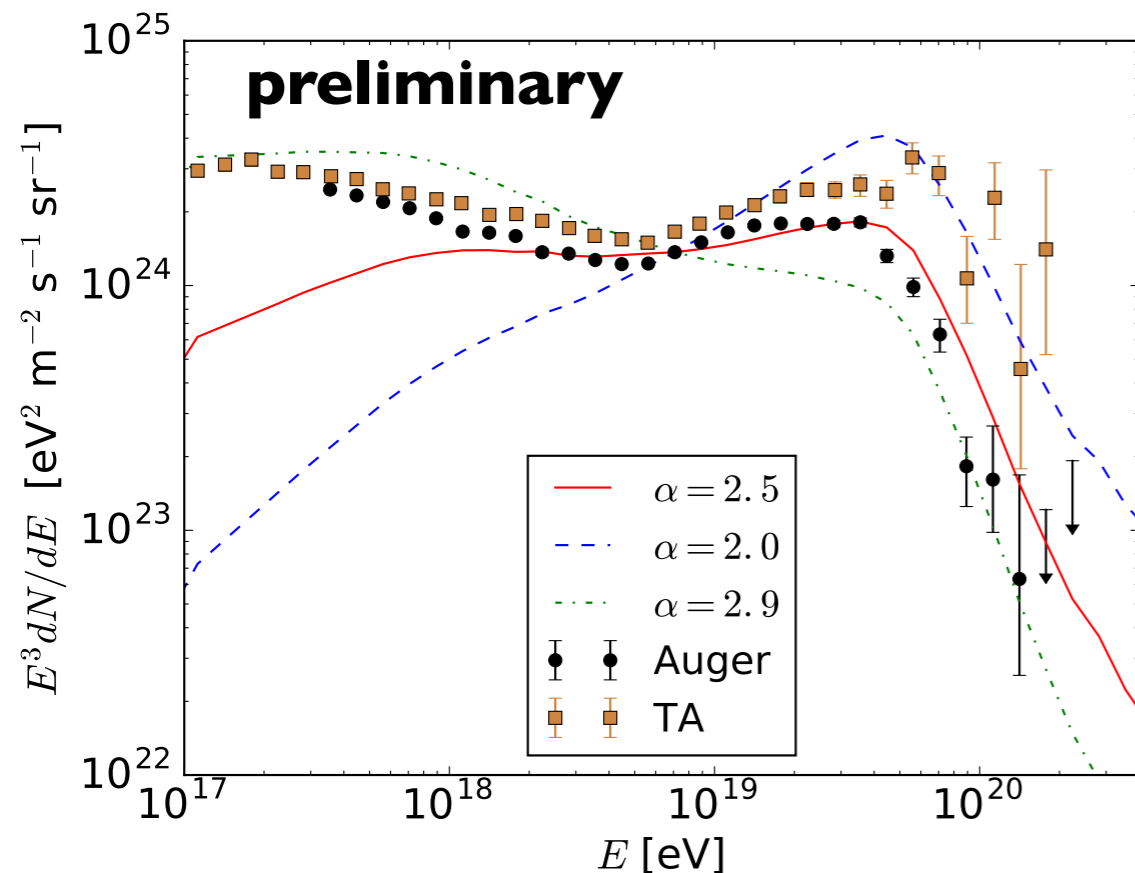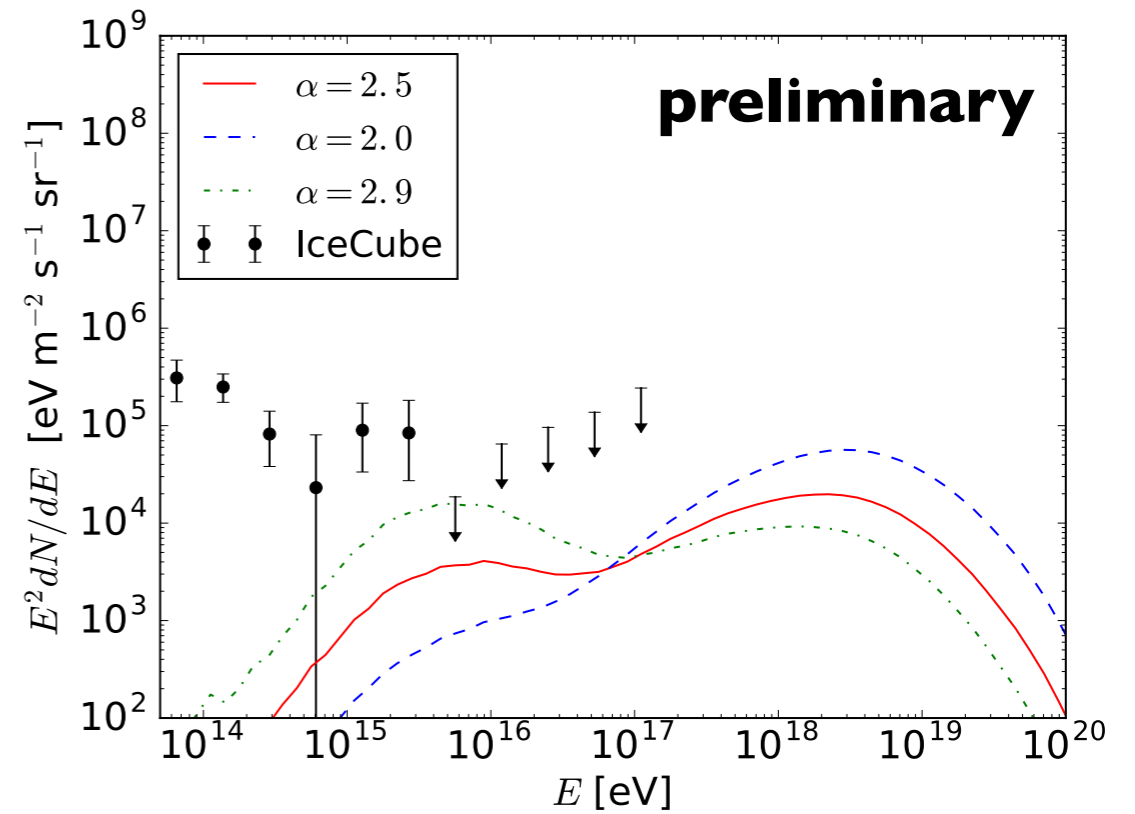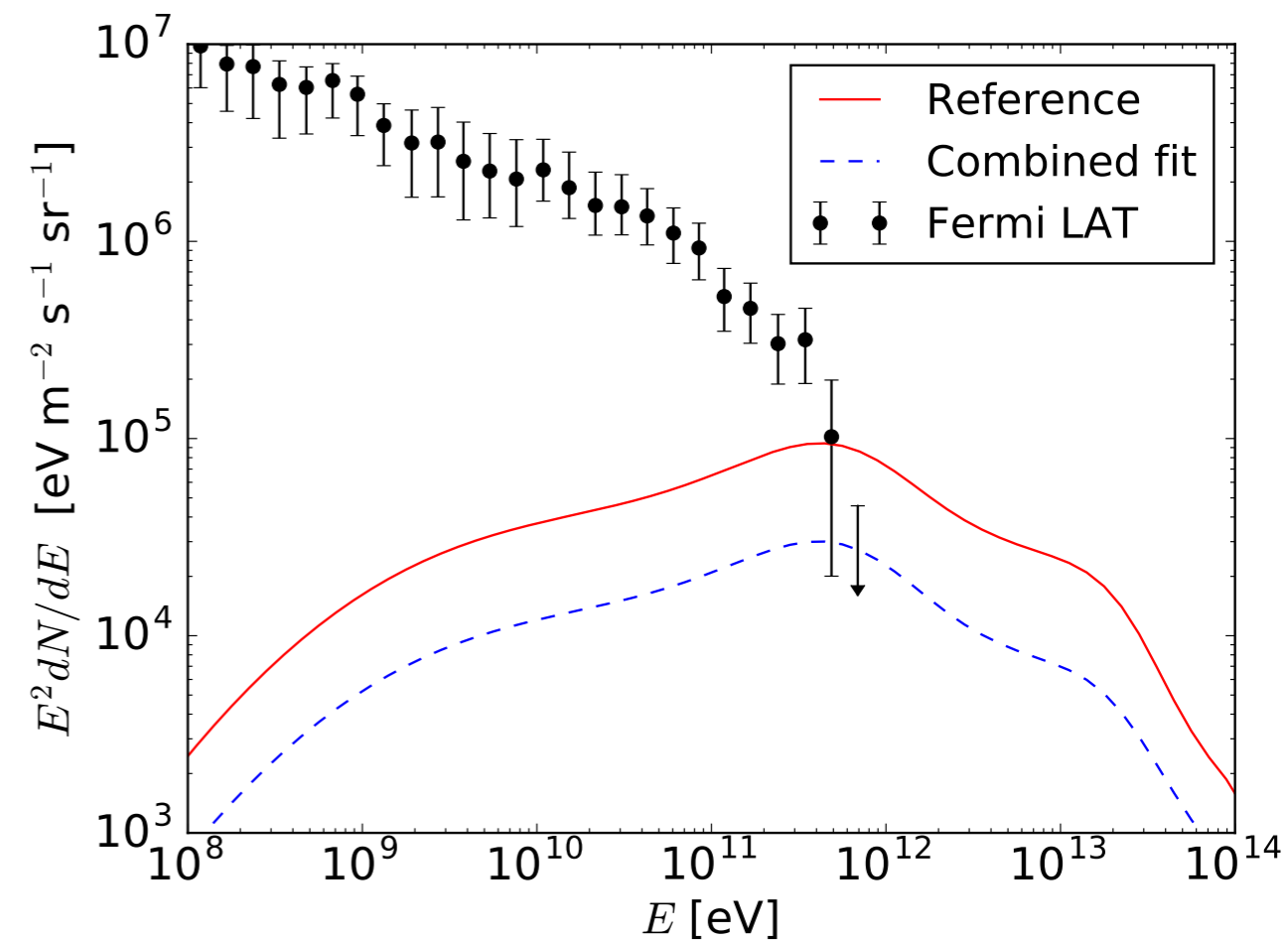- spectral index = 2.5

- maximal rigidity = 200 EV

- protons only

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- arXiv:1509.03732 (ICRC2015)

- sources: 98.69% nitrogen; 1.31% iron

- maximal rigidity = 4

- spectral index: 0.73

- no source evolution
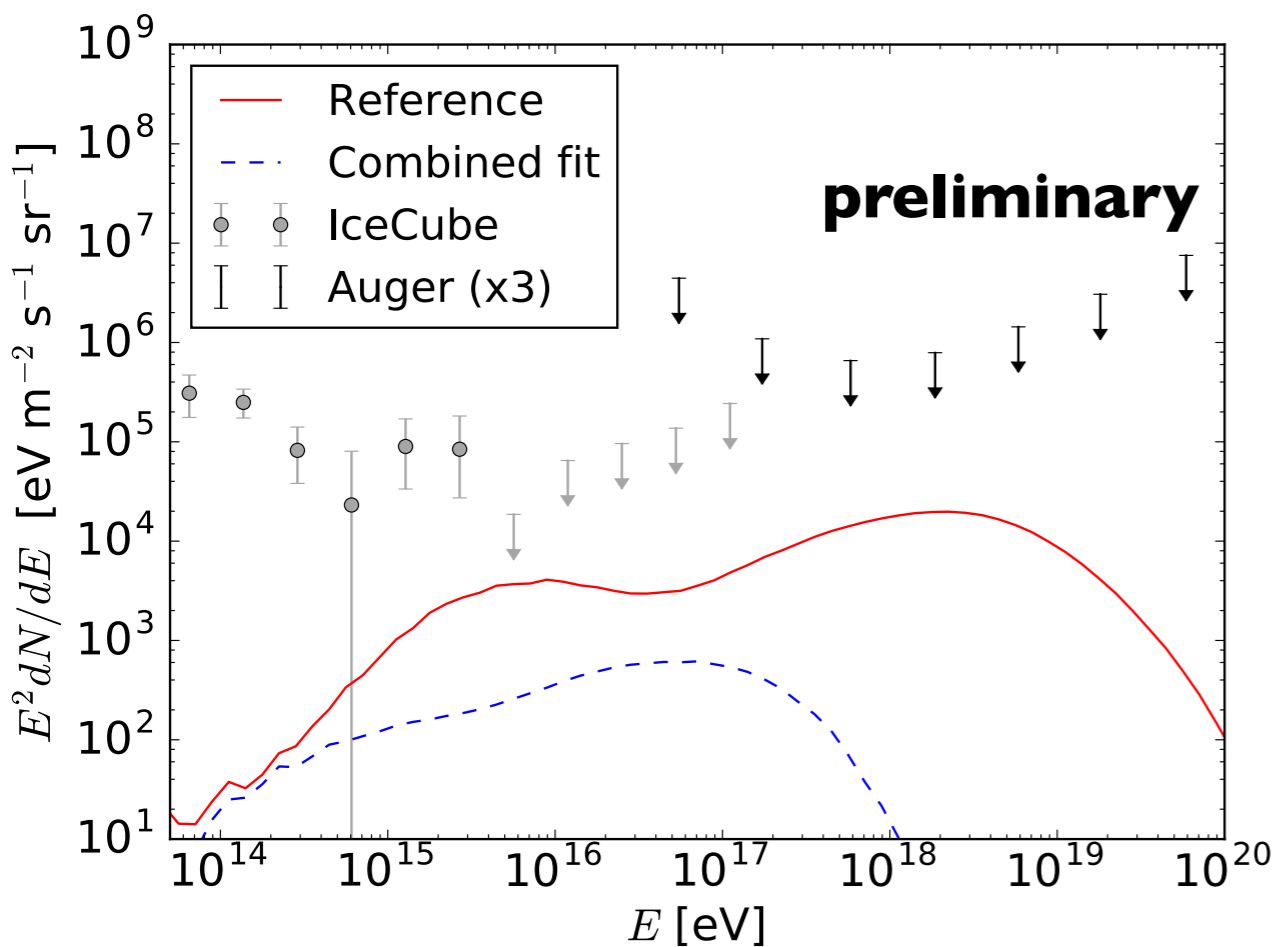


**preliminary**

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**preliminary**

Legend:
- $E^2 dN/dE = 10^{-8}$ GeV cm$^{-2}$ s$^{-1}$ sr$^{-1}$ (blue square)
- $E^2 dN/dE = 10^{-9}$ GeV cm$^{-2}$ s$^{-1}$ sr$^{-1}$ (red circle)
- $E^2 dN/dE = 10^{-10}$ GeV cm$^{-2}$ s$^{-1}$ sr$^{-1}$ (green triangle)

Axes: $m$ (vertical), Detectable proton percentage (horizontal)
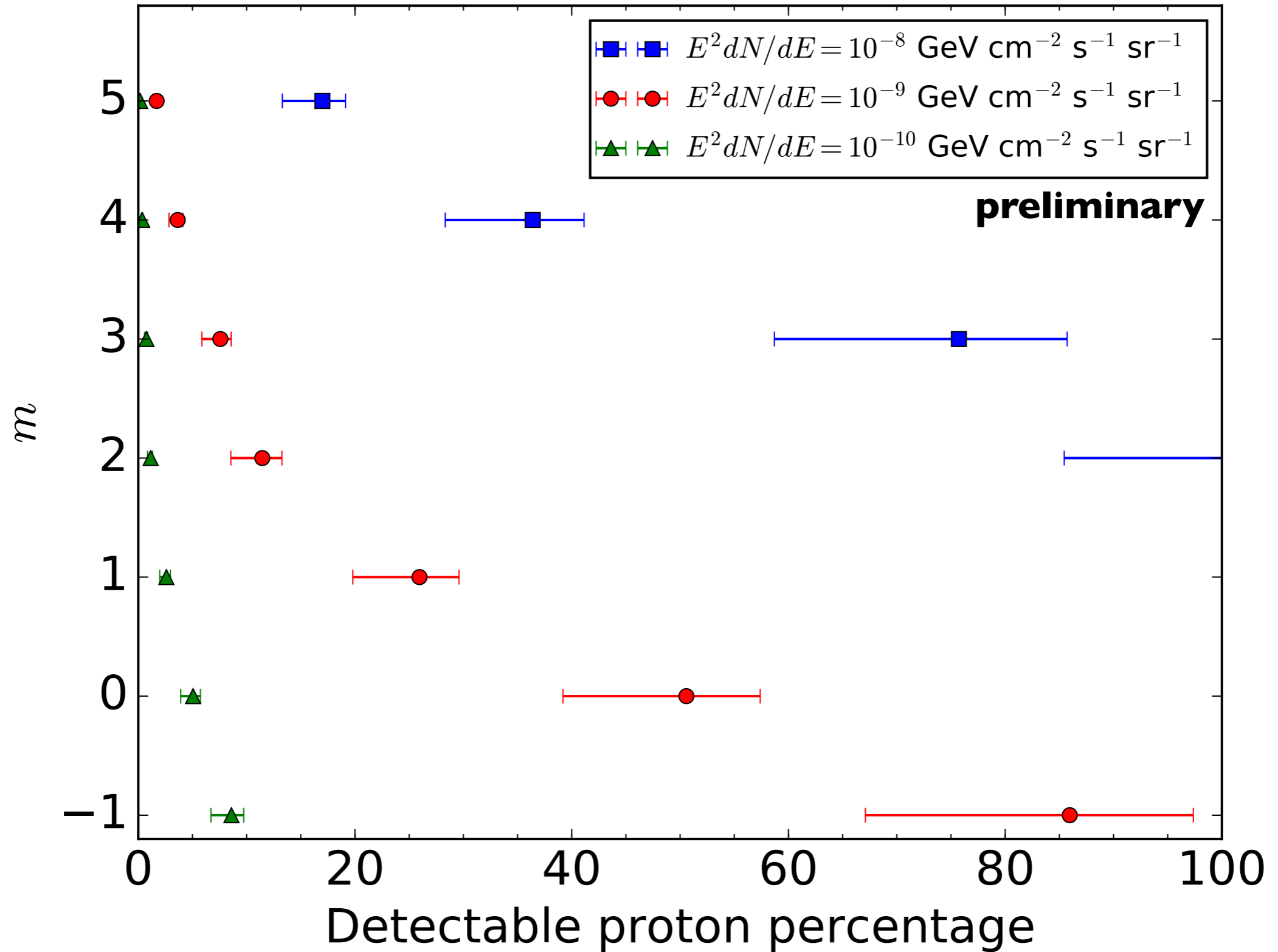
- not very accurate fit! (binning very rough, low statistics)

- extended Auger combined fit

- maximal rigidity = 6e18 EV

- spectral index = 0.5
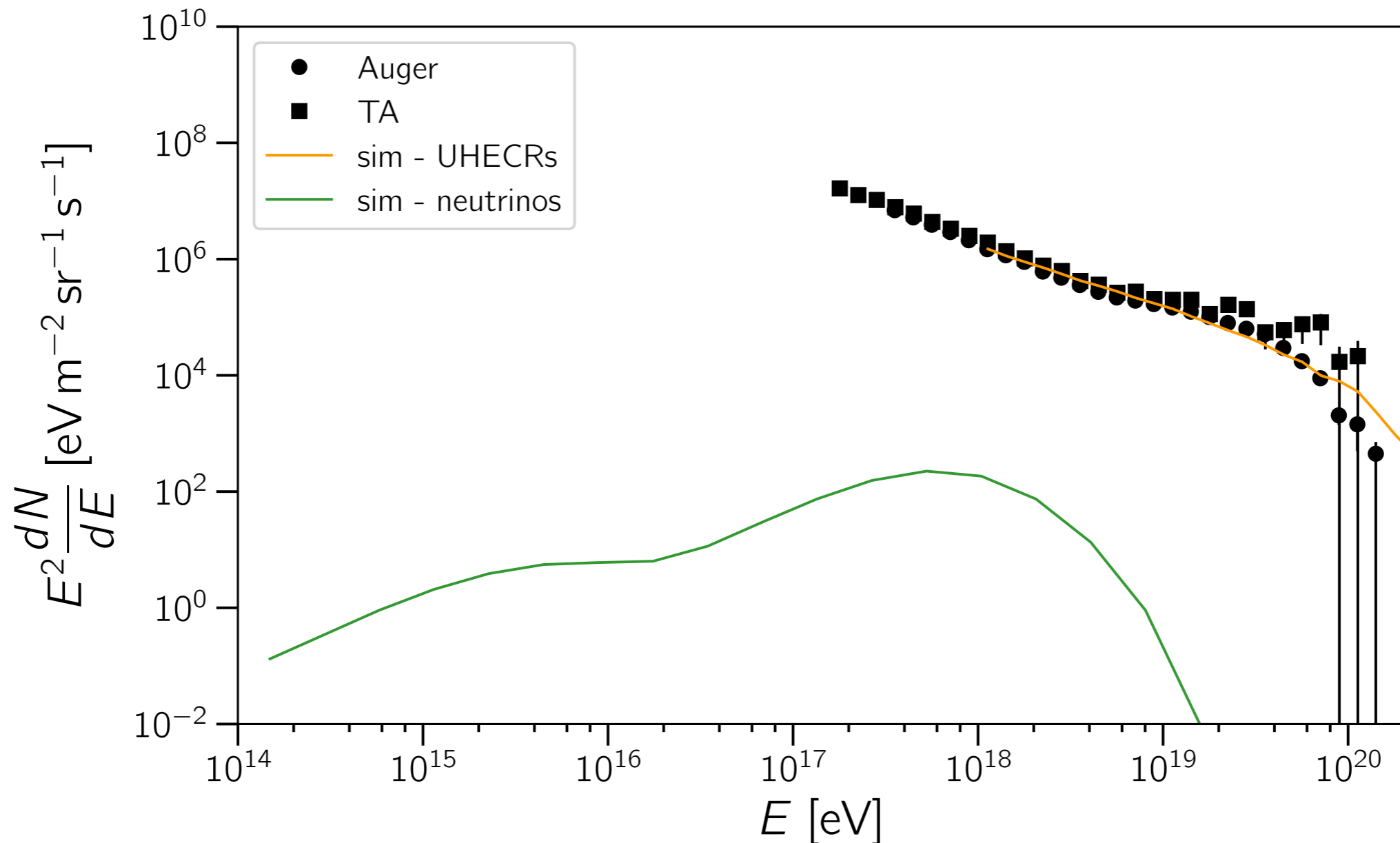
proton injection, $(1+z)^3 E^{-2.5}$

CMB only
Gilm. EBL
Dom. EBL
Stec. EBL
Knei. EBL
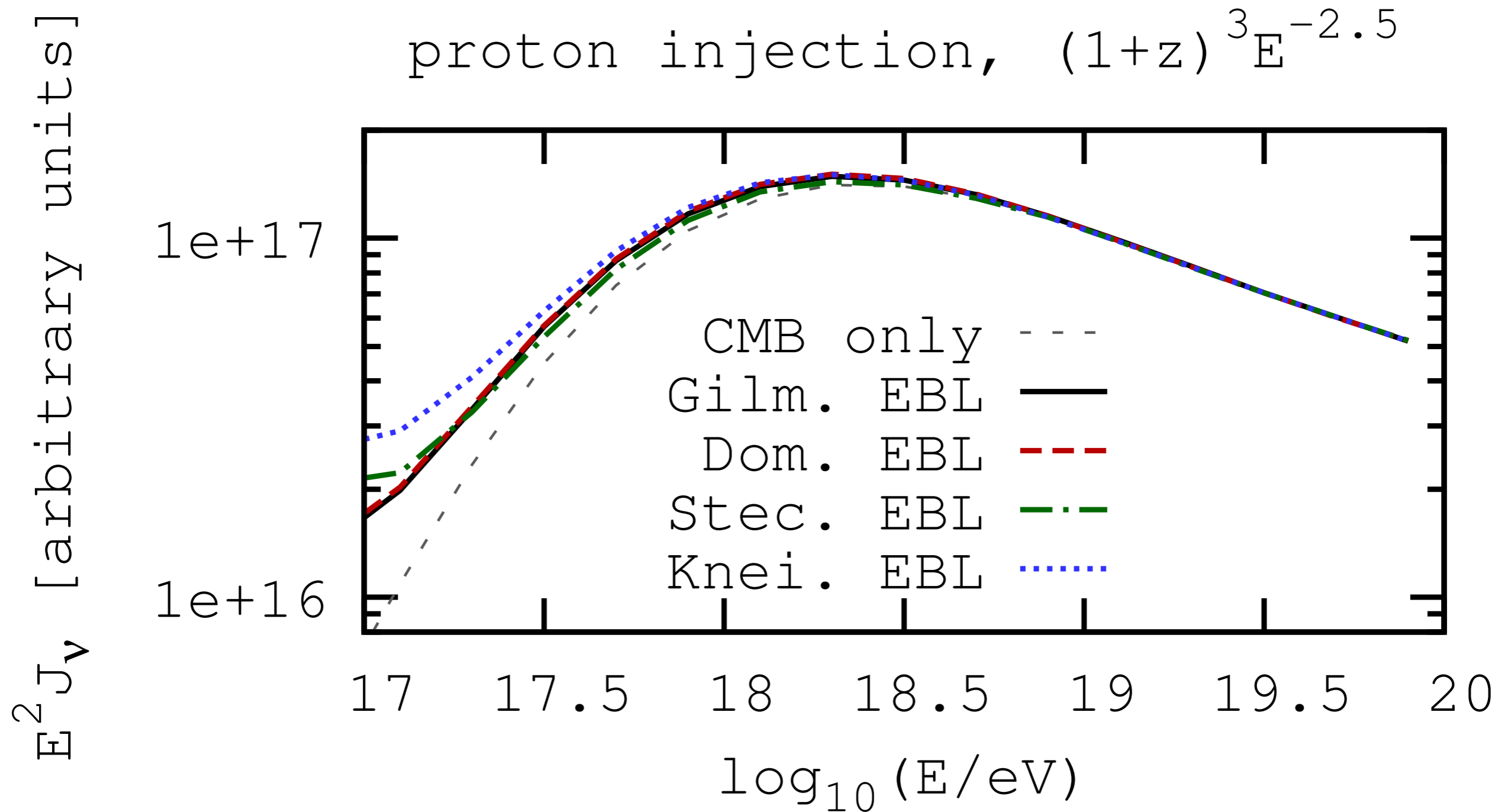
## sources of uncertainties

▸ photodisintegration cross sections

▸ EBL model

▸ scaling of alpha-channels



Extragalactic background light at z=1

Kneiske+ '04
Stecker+ '05
Franceschini+ '08
Dominguez+ '11
Dom.+ '11 unc.
Gilmore+ '12
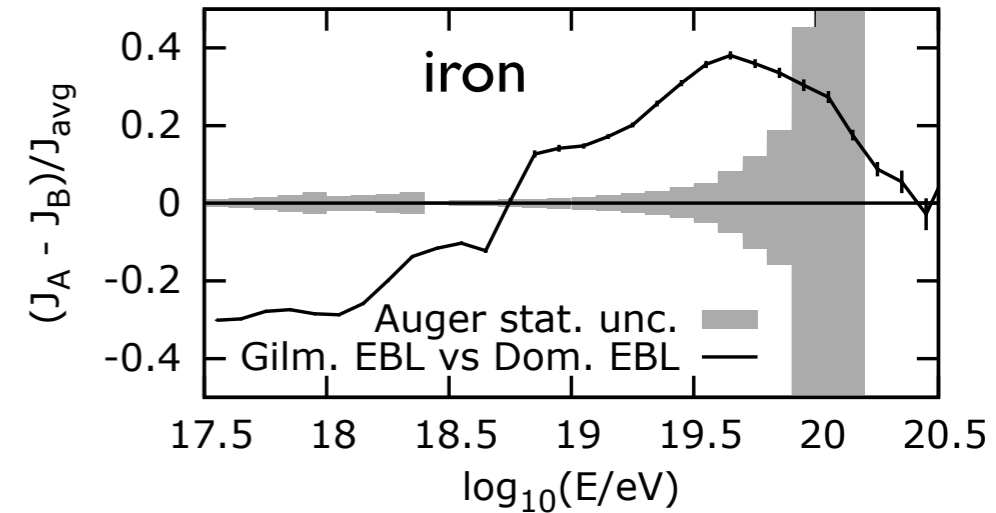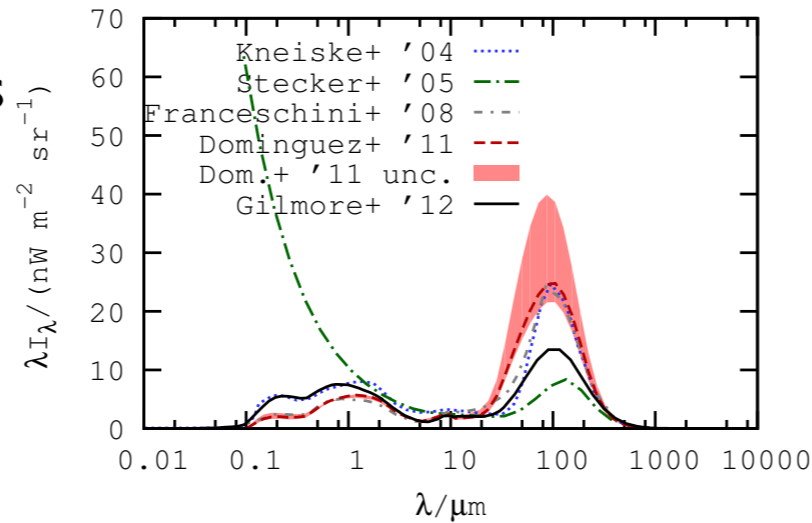


Cross section for $^{12}C(\gamma,\alpha)^8Be$, $^{12}C(\gamma,3\alpha)$

TALYS-1.0 (default)
TALYS-1.6 (default)
TALYS-1.6 (restored)
Kossov (TALYS BR)
Afanasev 2008



iron

Auger stat. unc.
Gilm. EBL vs Dom. EBL



Auger stat. unc.
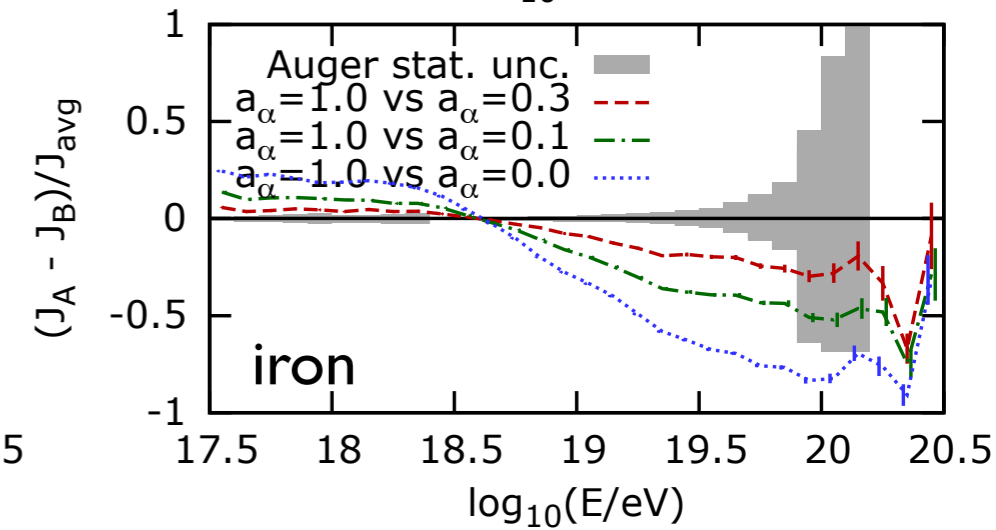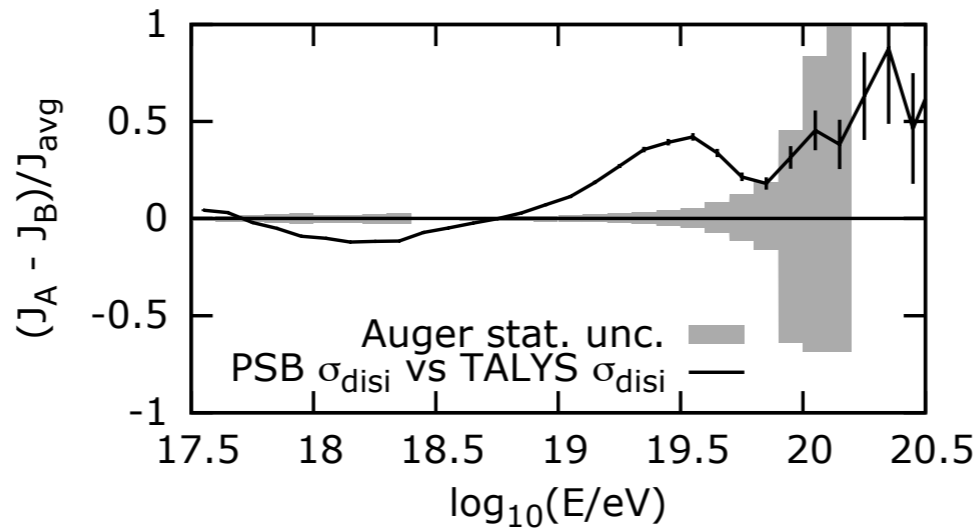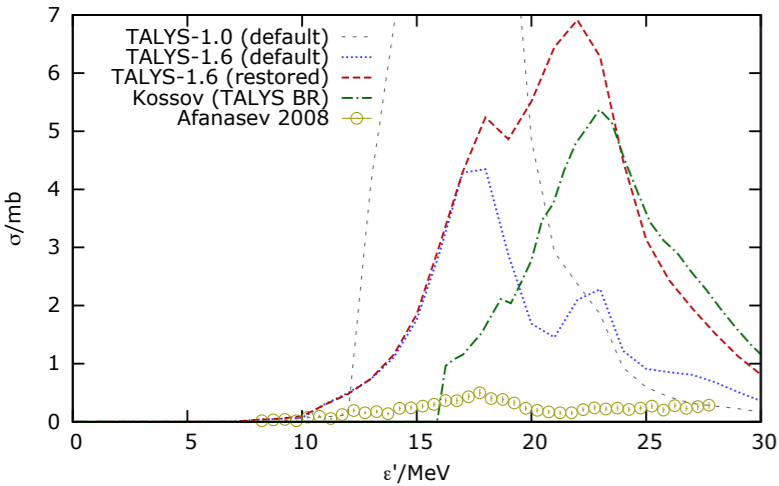PSB $\sigma_{disi}$ vs TALYS $\sigma_{disi}$



Auger stat. unc.
$a_\alpha=1.0$ vs $a_\alpha=0.3$
$a_\alpha=1.0$ vs $a_\alpha=0.1$
$a_\alpha=1.0$ vs $a_\alpha=0.0$

iron



Total photoabsorbtion cross section for $^{28}Si$

PSB (Stecker-Salamon)
TALYS-1.0 (default)
TALYS-1.6 (default)
TALYS-1.6 (restored)
Kossov
Ishkhanov 2002



Auger stat. unc.
PSB $\sigma_{disi}$ vs TALYS $\sigma_{disi}$



nitrogen

Auger stat. unc.
Gilm. EBL vs Dom. EBL