

UHECRs with Multi-messenger Astronomy

Source?

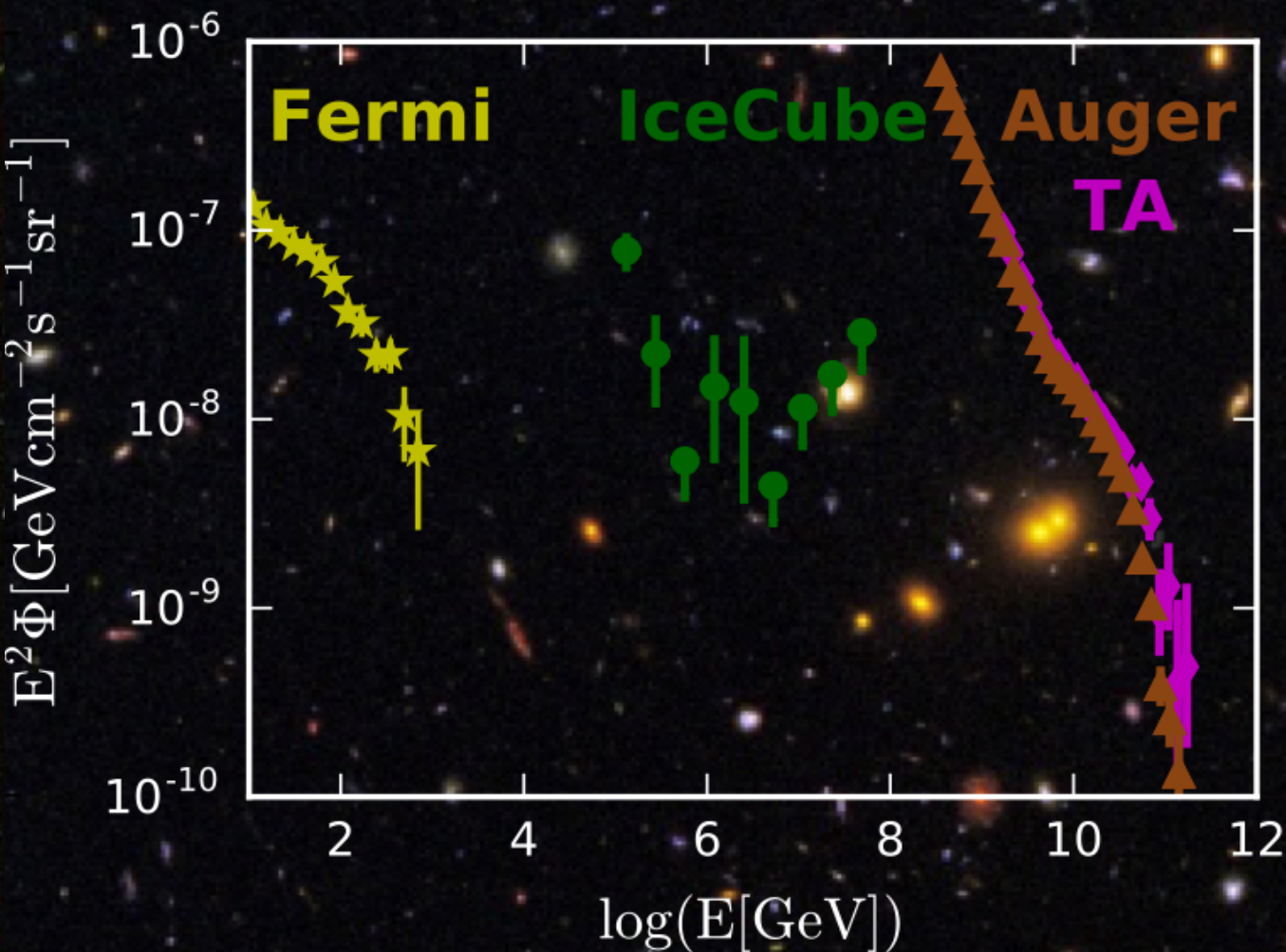
$$p + \gamma_{\text{cmb}} \rightarrow p + \pi^0$$

$$\pi^0 \rightarrow \gamma + \gamma$$

$$p + \gamma_{\text{cmb}} \rightarrow n + \pi^+$$

$$\pi^+ \rightarrow \nu_\mu + \mu^+$$

$$\mu^+ \rightarrow \bar{\nu}_\mu + \nu_e + e^+$$



IRB photons

