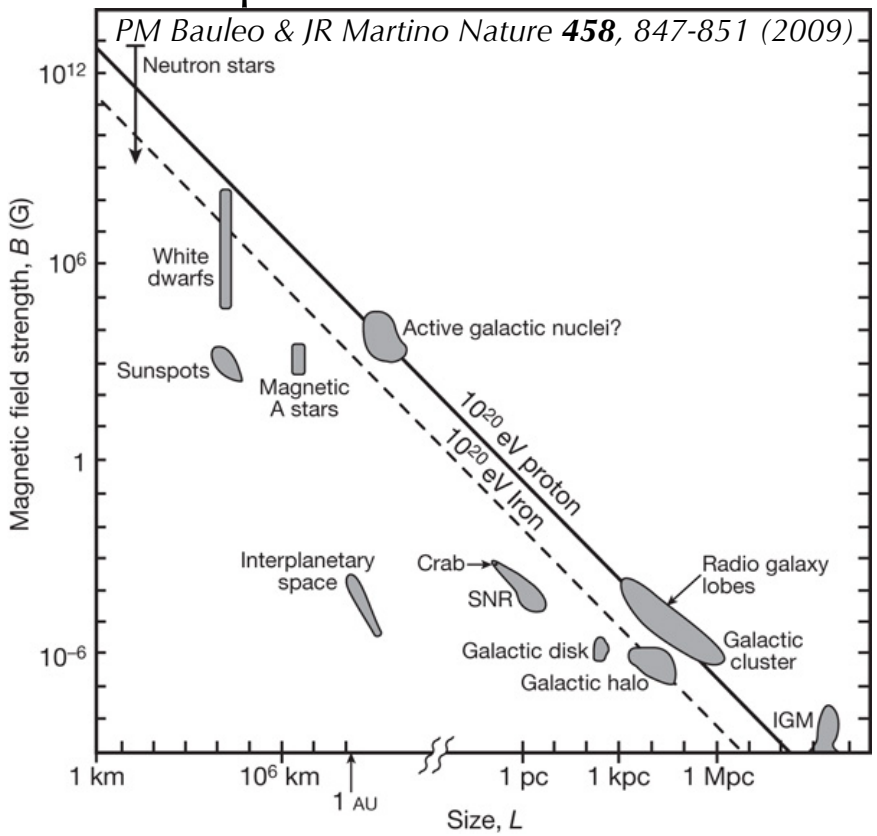
Astrophysical / accelerator sites?

Hillas plot:

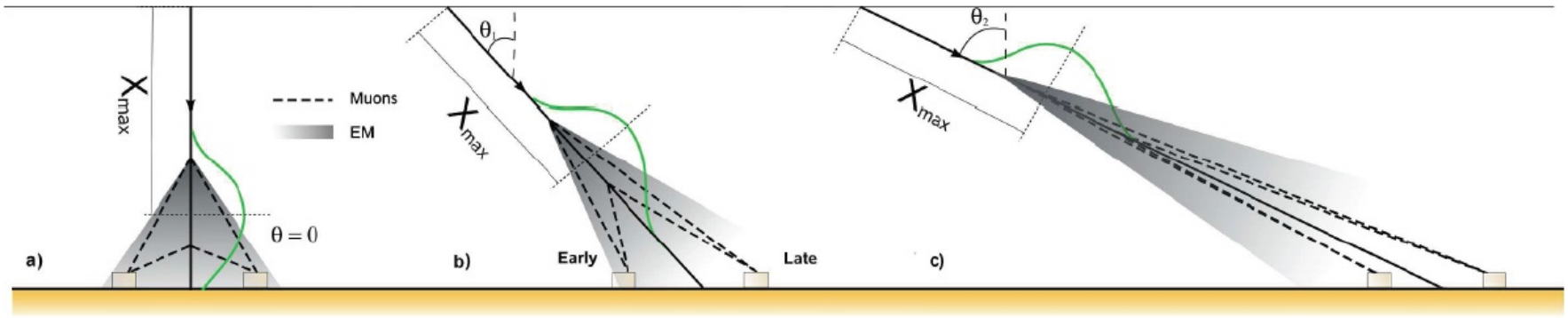


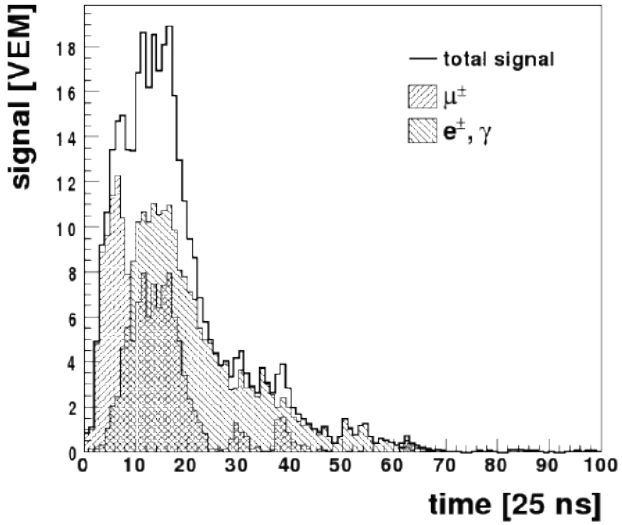
(size of the source)

- Maximum energy (energy loss not included)

$$10^{18} eV\ Z \left(\frac{R}{kpc}\right)\left(\frac{B}{\mu G}\right)$$

Composition study with SD - Rise Time

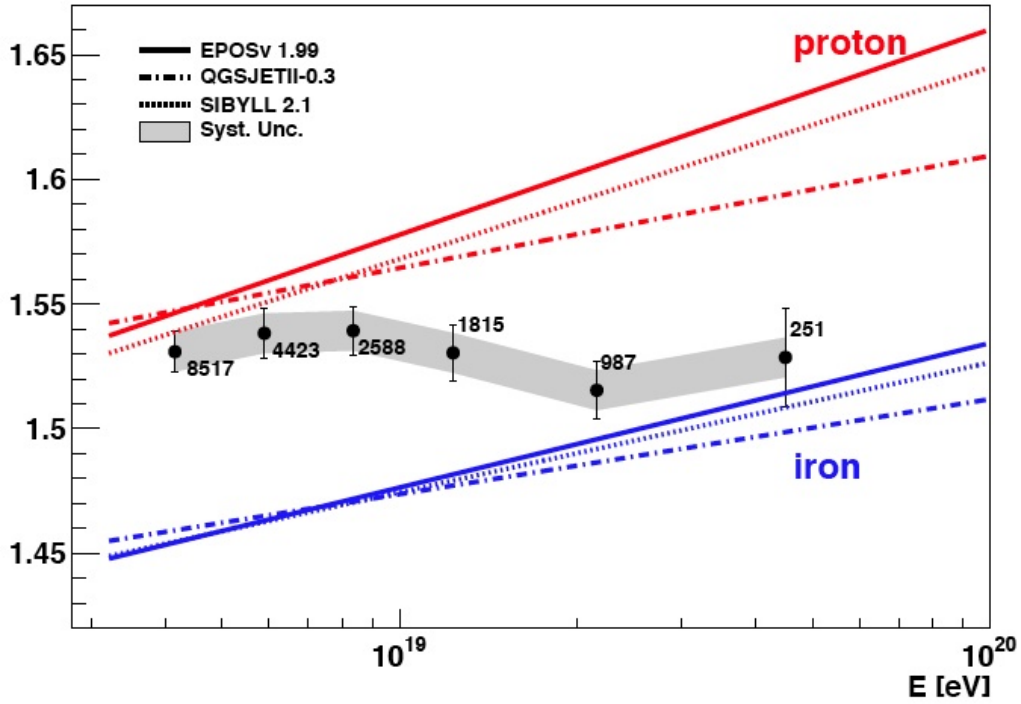




- The fast part of the signal is dominated by the muon response, while the EM is more spread out in time (due to multiple scattering).
- For non-vertical showers (not too inclined), the surface detectors will record, depending on their positions, different rise times (10% to 50%) corresponding to different stages of the shower development.

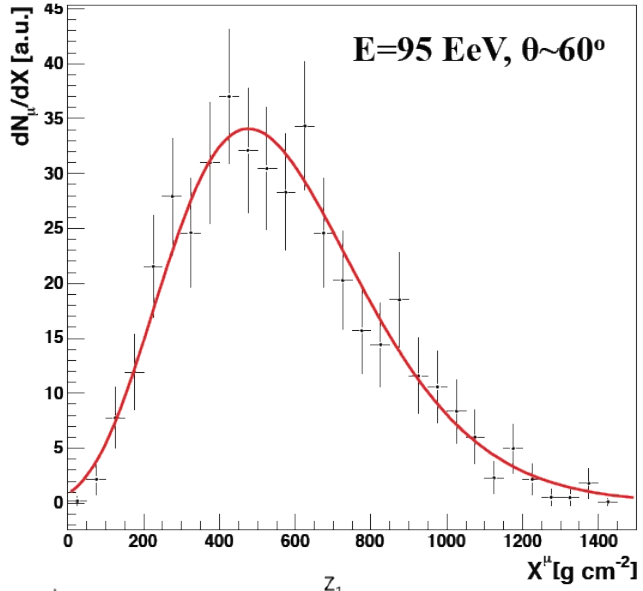
Composition study with SD - Rise time

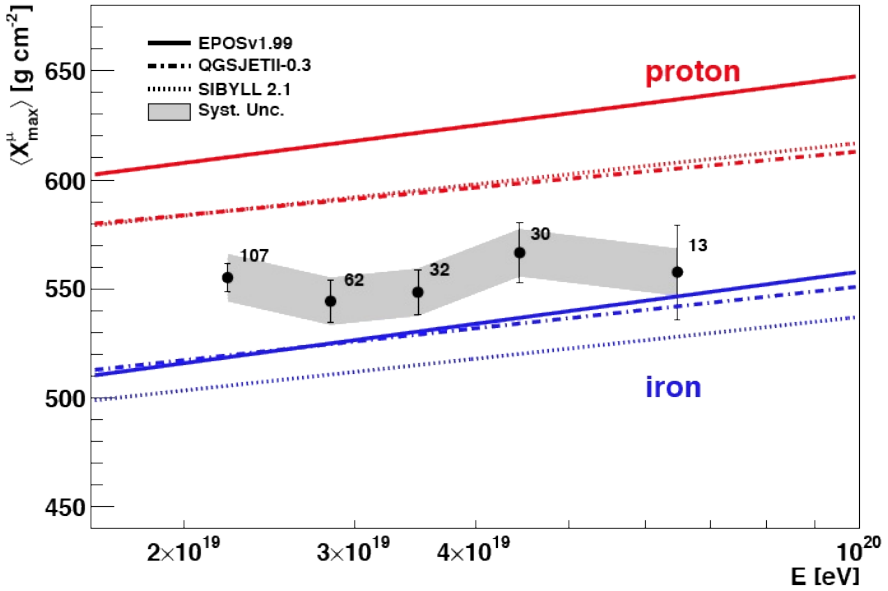
D.Garcia-Pinto for the Pierre Auger Collaboration, ICRC 2011

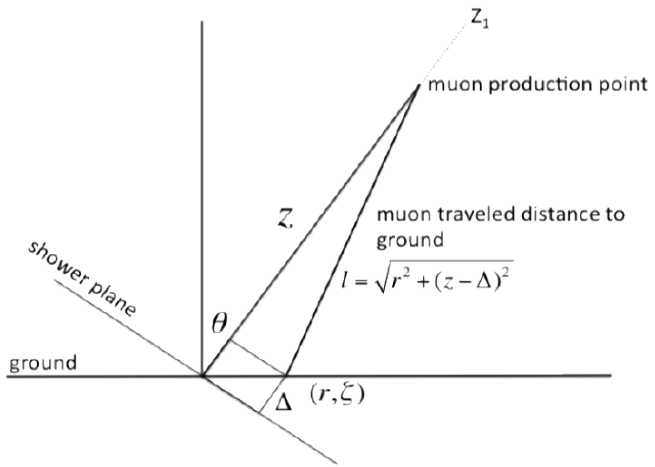


Composition study with SD - Muon Depth Profile

D.Garcia-Pinto for the Pierre Auger Collaboration, ICRC 2011







- The shape of the Muon Depth Profile contains information about the shower development (hadronic component)
- Event selection: 55°<θ<65°, r>1800m (distance to the core), E>2x10^{19}eV (below E - signal weak, error large)
- 244 SD events (Jan'04-Dec'10)