



Study of Atmospheric Showers Simulations, considering different types of detectors

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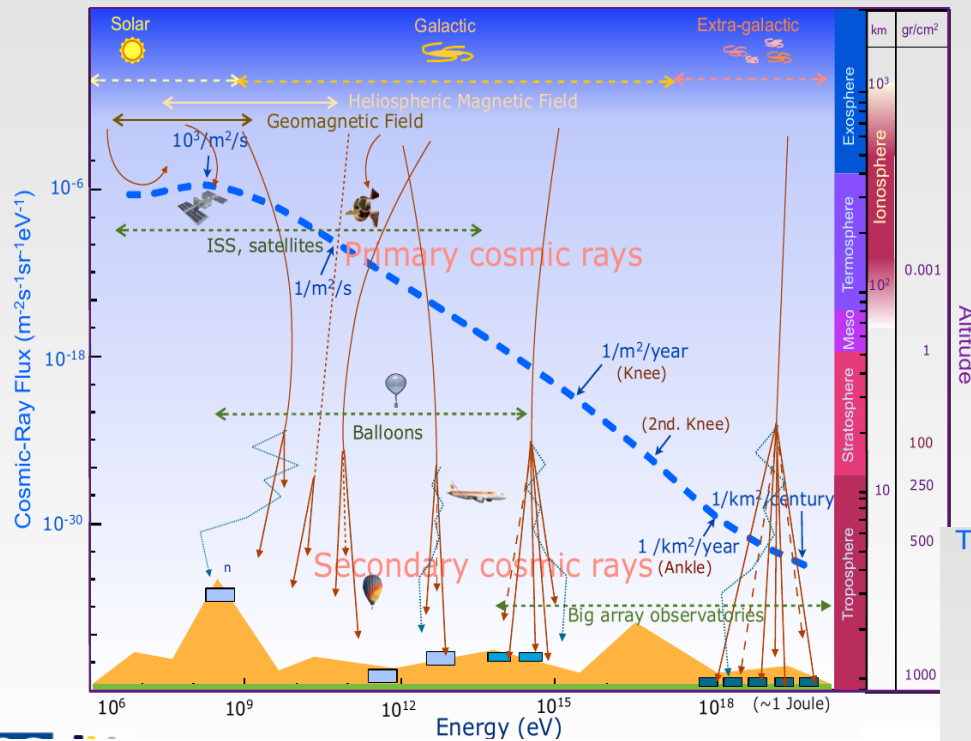


Take home message...

- New proposal to measure the extensive air showers.
- More precise measurement of the electromagnetic and muonic components.
- Different way to have information about mass composition.

Cosmic Rays

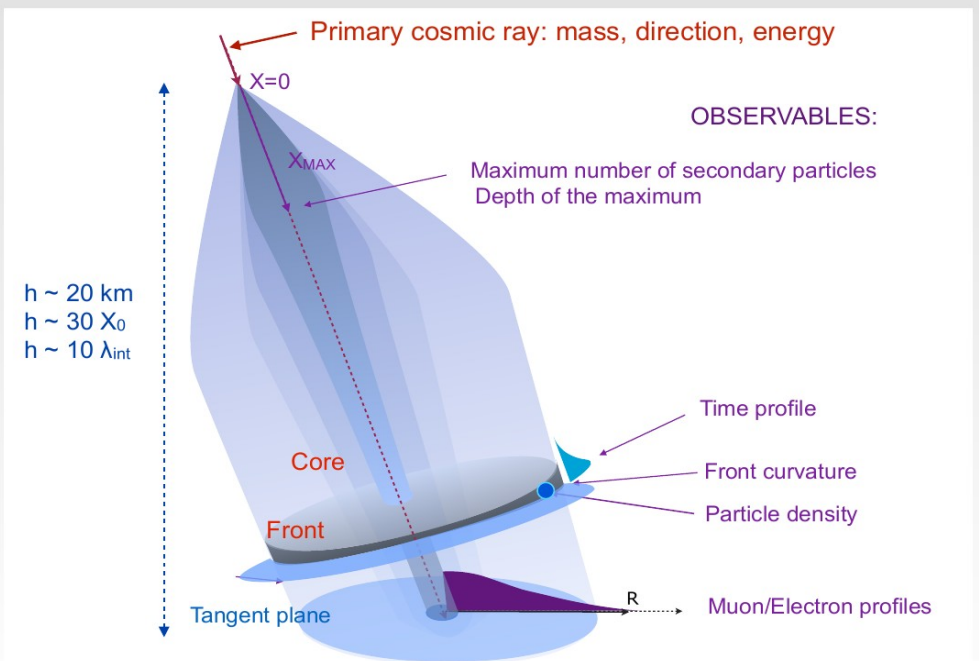
The energy spectrum



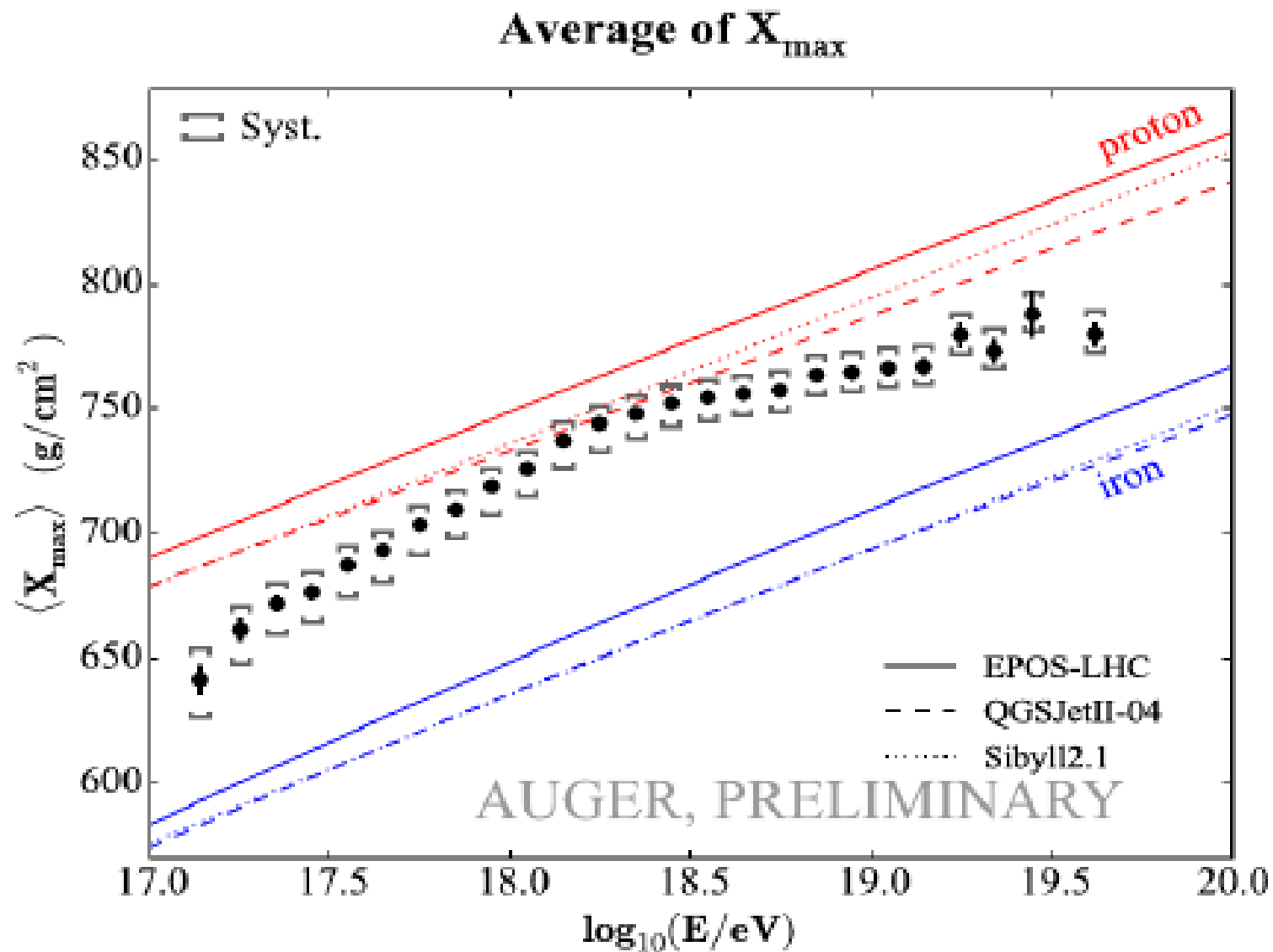
- Observables: arrival angles, (θ, ϕ) , energy, X_{max} .

- Discovered by Victor Hess in 1912.
- Direct and indirect methods to measure them.
- Cover a energy range that goes from 10^6 to 10^{21} eV

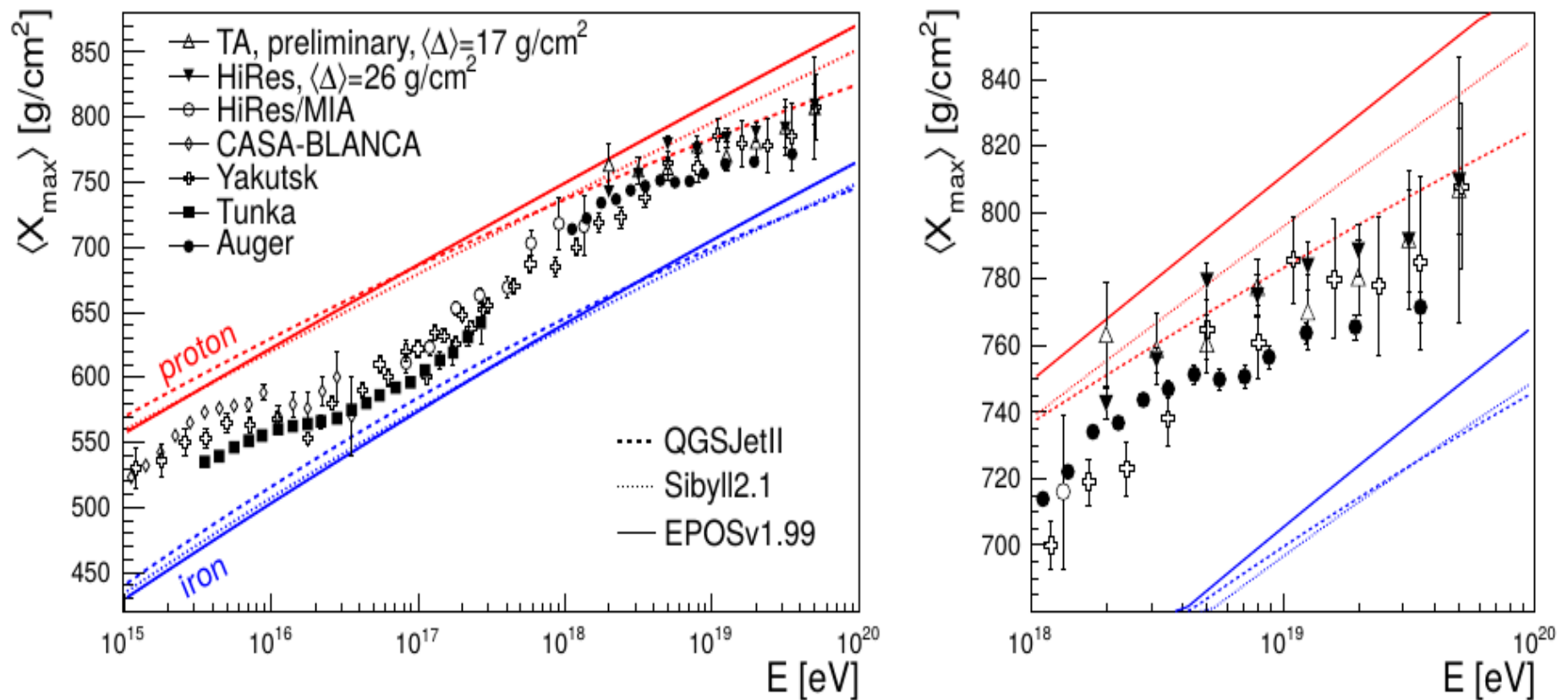
The extended air showers, EAS



Mass composition



Mass composition



- Measurements of X_{\max} for different experiments compared to air shower simulations. In the right panel a zoom is shown to the ultra-high energy region[1].

1. Kampert, Karl-Heinz et al. Astropart.Phys.35(2012) 660-678 arXiv:1201.0018 [astro-ph.HE].

Electromagnetic and muonic components

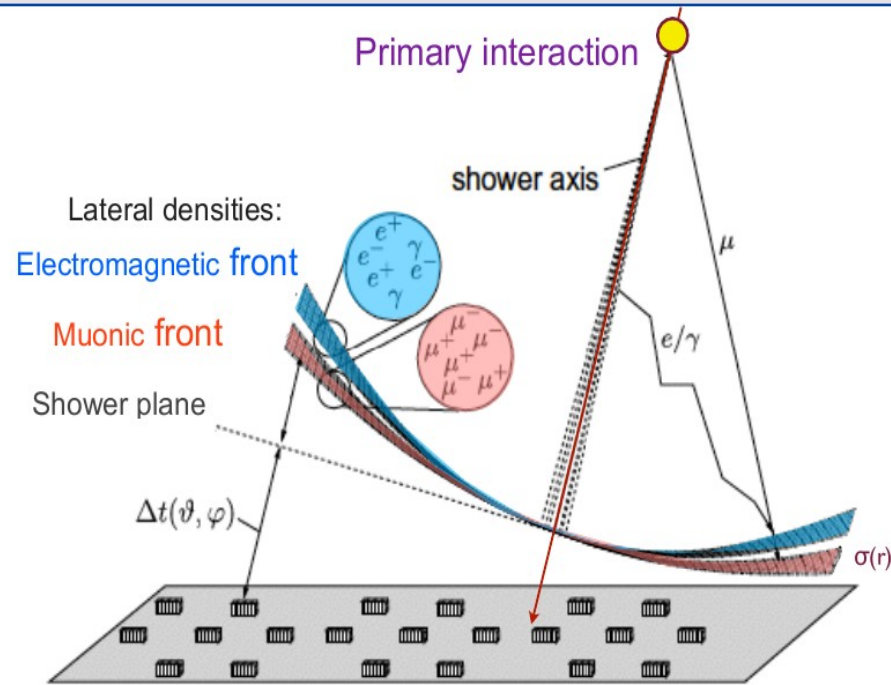
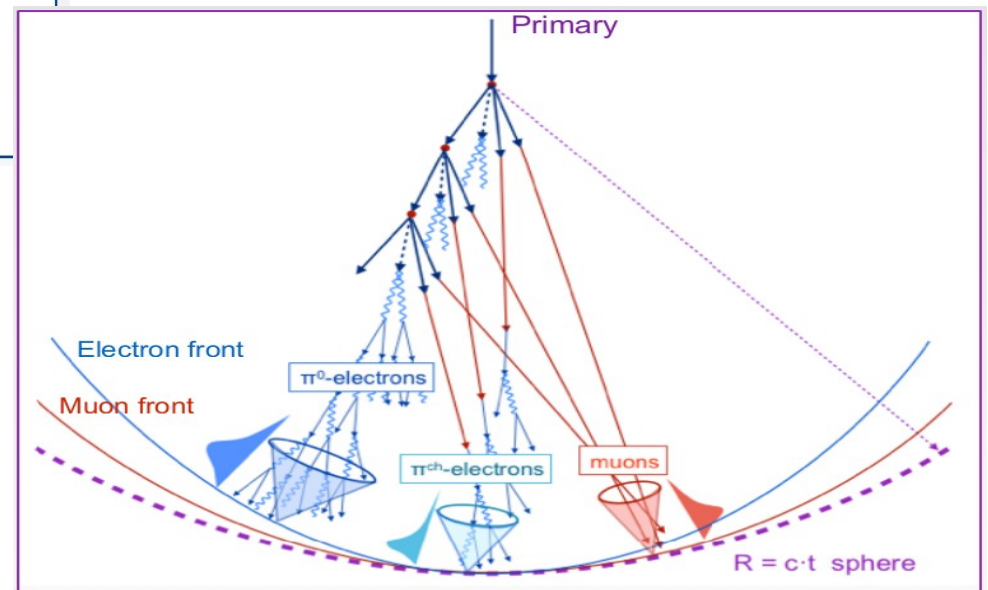


Fig. 3. Scheme of the shower development in the atmosphere

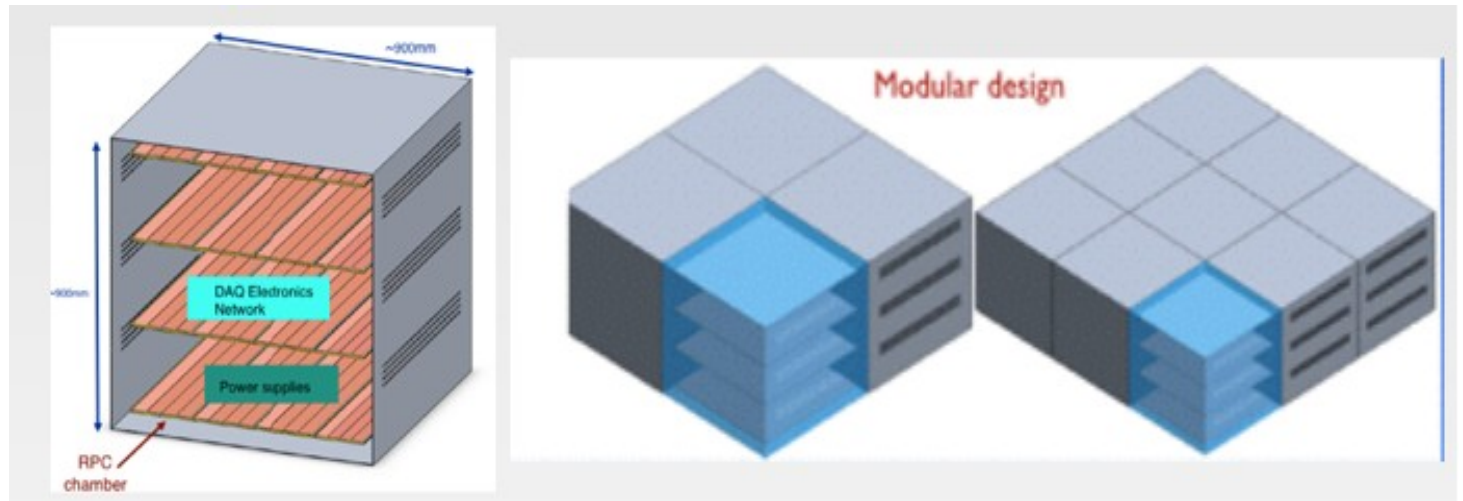
- Better discrimination between electromagnetic and muonic component.

- High particles: mainly protons (89%), Helium (10%) or heavier nuclei (1%)



TRASGO (TRAck and time reconStructinG bOx)

- New proposal to study extensive atmospheric showers, in collaboration with Prof. Juan Antonio Garzón, from Santiago Compostela University.
- Main objective have a better understanding of the mass composition of EAS, at low energies.

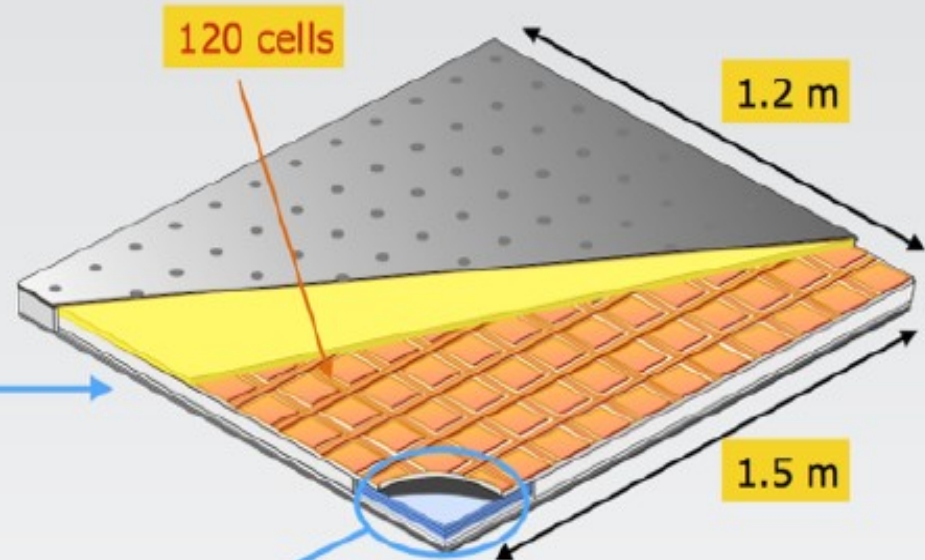


- High temporal resolution (~ 100 ps)
- High granularity: multiparticle capability
- Tracking capability

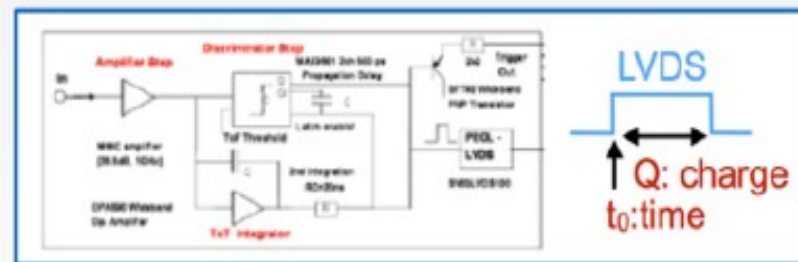
Detector Structure



LIP-Coimbra Marta/ P. Auger RPCs

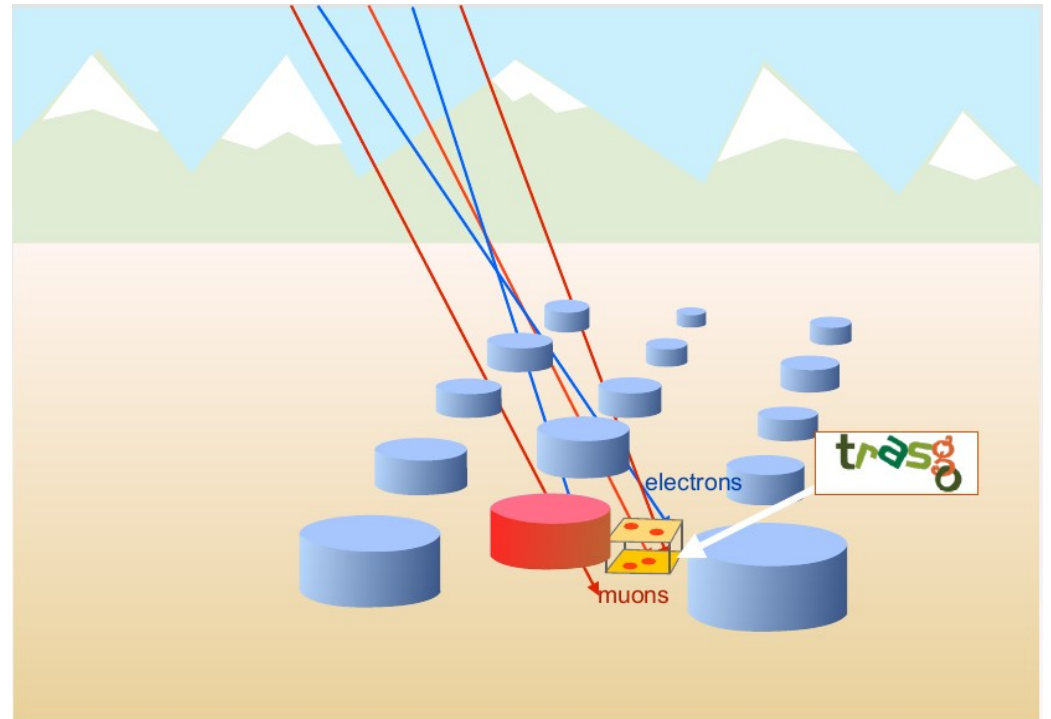
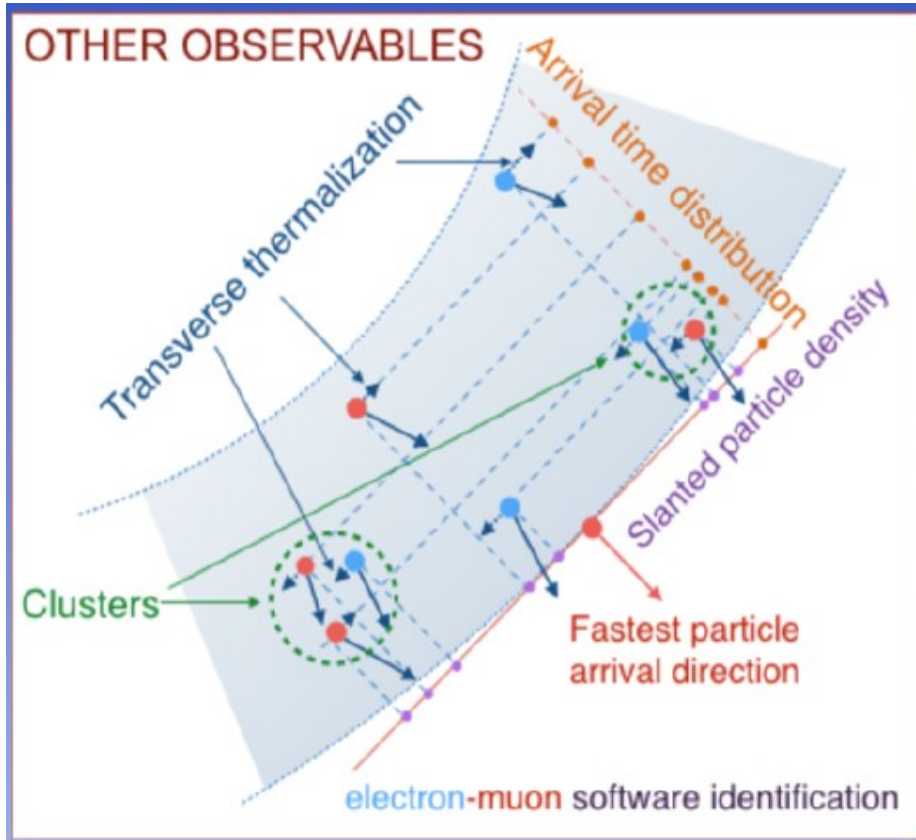


Resistive Plate Chamber



HADES-GSI FEE

- More precise measurements of the LDF.
- More information about the cosmic ray composition.



Work Proposal

- Create a global network: CORSAIR (Cosmic Ray SimulAtion Reserach Network)
- Special knowlodgements to the LNS for the offered computing resources.

