

Studies of a Muon-Based Mass-Sensitive Parameter for the IceTop Surface Array



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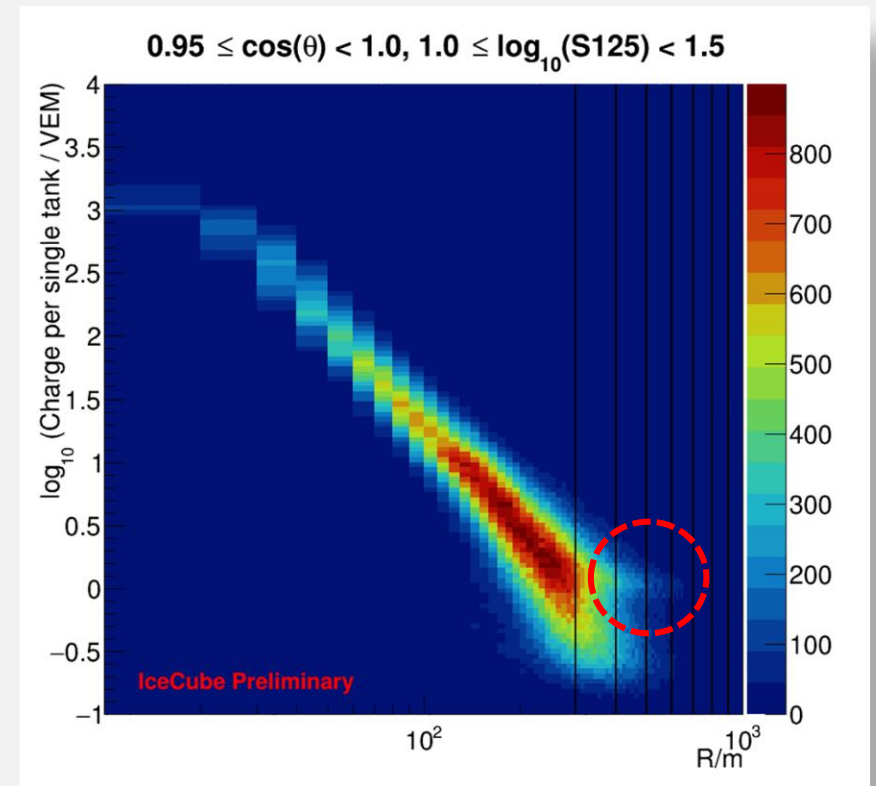


What is the motivation?

Air showers induced by heavier primary particles develop earlier in the atmosphere and produce more muons observable at ground level than lighter cosmic rays with the same primary energy. Therefore, the fraction of muons to all charged particles measured by IceTop can characterize the mass of primary particles.

What have we done?

- Considering the charge signal distribution, a muon parameter per individual shower was defined and estimated.
- Using the shower size S125 and the estimated muon parameter at a reference distance, the mass-sensitive ratio is estimated event by event, based on the interaction model of Sibyll 2.1 and 10% of 2012 IceTop data.



What is the result?

- The estimated mass-sensitive parameter clearly shows the primary mass dependence
- The data seems to favour heavy primaries in the energy range of 10 PeV.
- This parameter can be applied to select datasets for different mass groups and for mass composition studies.
- Further mass composition studies are in progress.

