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Reconstruction of Muon Production Depth in grounded array based on the TTC (Time Track Complementarity) method

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The muon longitudinal profile along the shower axis is strictly connected to the primary nature and primary hadronic interaction with air nuclei. The detection of muonic component inside showers generated by Very High Energy Cosmic Rays provides a very powerful tool for sensing high energy interactions between cosmic ray particles and air molecules. Fundamental parameters as the interaction cross section, inelasticity, hadron production and multiplicity can be measured comparing the development of shower electromagnetic component with that of muonic component. Since 1992 a method has been developed to combine the muon arrival direction in a ground based array for cosmic ray detection with their arrival delay respect to the shower axis in the shower core. This combination permits to select high energy muons weakly scattered from atmosphere and reconstruct their height of production with good accuracy. In this talk we discuss on the possibility to realize a “dual” apparatus able to detect both electromagnetic and muonic components at primary energy greater than 10^{17} .

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