Contribution ID: **106** Type: **Oral contribution**

CaloCube: a high perfomances calorimeter for the detection of high-energy cosmic rays in space

Friday, April 21, 2017 2:00 PM (20 minutes)

The direct observation of high-energy cosmic rays, up to the PeV region, will depend on highly performing calorimeters, and the physics performance will be primarily determined by their geometrical acceptance and energy resolution.Thus, it is fundamental to optimize their geometrical design, granularity, and absorption depth,with respect to the total mass of the apparatus, probably the most important constraints for a space mission. Furthermore a calorimeter based space experiment can provide not only flux measurements, but also energy spectra and particle identification to overcome some of the limitations of ground based experiments. Calocube is a homogeneous calorimeter whose basic geometry is cubic and isotropic, so as to detect particles arriving from every direction in space, thus maximizing the acceptance; granularity is obtained by filling the cubic volume with small cubic scintillating crystals. A prototype, instrumented with CsI(Tl) cubic crystals, has been constructed and tested with particle beams. An overview of the obtained results will be presented and the perspectives for future space experiments will be discussed.

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Session Classification: Sessione Nuove Tecnologie

Track Classification: Sessione Nuove Tecnologie