Contribution ID: **18** Type: **Contributed Talk**

# Enhancement of the hadron electron discrimination in calorimeters by detection of the neutron component.

*Friday, 19 February 2010 15:55 (25 minutes)*

In many physics experiments where calorimeters are employed, the requirement of an accurate energy measurement is accompanied by the requirement of a very high hadron electron discrimination power.
Normally the latter requirement is achieved by designing a high granularity detector with sufficient depth so that the showers can fully develop.
This method has many drawbacks ranging from the high number of electronic channels to the high mass of the detector itself. Some of these drawbacks may in fact limit severely the deployment of such a detector in many experiments, most notably space based ones.
Another method which has been proposed by our group and is currently under investigation is through the use of scintillation detectors which are sensitive to the neutron component of the hadron showers.
Here a review of the current status will be presented starting with the simulations performed both with GEANT4 and FLUKA. A small prototype detector has been built following the simulation outputs and has been tested at a neutron beam and at a high energy pion/electron beam behind a "shallow" calorimeter.
Results are encouraging and indicate that it is possible to augment the discrimination power of an existing calorimeter by the addition of a small mass neutron detector, thus paving the way for better performing astroparticle experiments.

## Summary (Additional text describing your work. Can be pasted here or give an URL to a PDF document):

Our group is currently involved in high energy physics both at the LHC and in the astroparticle field (PAMELA). The experience gained in the design of the PAMELA calorimeter, where in fact a small thermal neutron detector has been placed, led us to envisage this kind of solution also for the next space based experiment which are under proposal today (i.e. CALET).

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**Session Classification:** Calorimeters 4