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Calorimeters for absolute luminosity measurement at upgraded DAFNE

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Summary

In order to provide a precise, fast and reliable measurement of the luminosity for the e+e- collider of Frascati [DAFNE] during the crabbed waist collision tests in the 2008 run a set of calorimetric detectors have been designed, realized and put in operation:

- a set of 2x2 half rings [back-to-back with respect to the interaction point], realized by 5 trapezoidal sectors [covering 30 degrees in phi each] of sandwich calorimeters [lead and scintillator read by WLS fibers]; these detectors have been optimized for detecting Bhabha events in the angular range 18 to 27 degrees.
- a couple of back-to-back radiative Bhabha proportional counters, each made up of four PbWO4 crystals, at very small angle [~1.7 mrad]. Those counters, thanks to the very high rate, are essential for real-time optimization of the machine, even though are sensitive to backgrounds and particles lost by the beams. Those calorimeters have been carefully characterized and calibrated at the Frascati BTF facility with electron beams [linearity, resolution and uniformity have been measured]. Moreover, a full simulation of the setup has been performed using GEANT, in order to have a precise determination of the acceptance, including the most precise event generators for Bhabha processes and calculated paths for Touscheck backgrounds.

The data acquisition system, capable of several kHz of rate and of measuring the dead

time with good accuracy, is based on the KLOE experiment DAQ and
acquirese both the
analog signal fed into charge ADC and the digitized signals fed
into TDC and scaler
for rate measurement and offline correction of the luminosity.

Primary author: VALENTE, Paolo (RM1)

Presenter: BRANCHINI, Paolo (INFN Roma Tre)

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