Subject: updates on the forward end-cap geometry and simulations
Posted by HosseinMoeini on Mon, 15 Apr 2013 12:00:13 GMT
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Dear all,

Based on (in accordance with) the results of the about-to-be-submitted paper for the FwEndCap ("Design studies of the PWO End-cap Calorimeter for PANDA"), the following updates have been implemented in the PandaRoot code:

1) new geometry root file (emc_module3_2012_new.root) for the forward end-cap added to /pandaroot/geometry/, based on the latest mechanical designs. It is only very slightly modified from the previous geometry (emc_module3_2011_new.root).

One realizes that the distance of the FwEndCap to the target point is set in
/pandaroot/emc/EmcMC/PndEmc.cxx
to 213.9 cm (latest mechanical design!)

The root macro to produce such geometry is
/pandaroot/geometry/createRootGeoFileFwEndCap_Sep2012.C

2) two lookup tables added for the Energy/Angle corrections of the clusters in the whole EMC. For the end caps no energy non-uniformity is expected, while, for the Barrel crystals, a 1.5% non-linearity per cm is obtained based on the results of the proto60 experiment in Mainz. Hence, the following two lookup tables should be used (one for the Barrel crystals and the other for the end caps)!
/pandaroot/macro/emc/dedicated/EnergyPosCorrection/emc_EnergyAngleCorrec
tionLookupTableForPhotons_BarrelNonlinearity1.5percentPerCM.root
/pandaroot/macro/emc/dedicated/EnergyPosCorrection/emc_EnergyAngleCorrec
tionLookupTableForPhotons_NoNonlinearity.root

Class /pandaroot/emc/EmcDigi/PndEmcHitProducer.cxx is updated to impose the defined non-uniformity in /pandaroot/emc/EmcDigi/PndEmcDigiNonuniformityPar.cxx only on the Barrel module!

2) in the /pandaroot/emc/EmcData/PndEmcClusterProperties.cxx (LiloWhere), the new functional form for the W0 (below) is defined. In this class, the A, B, and C parameters are read in from the now-updated /pandaroot/macro/params/emc.par parameter file.

W0=4.071-0.678(E_{cl})^{-0.534} exp(-(E_{cl})^{1.171})
, in which E_{cl} is in GeV.

The details on how to get to this optimized function for the W0 in the PANDA FwEndCap can be find in the above-mentioned paper. The previous implementation of W0 in the PandaRoot package was an exact copy from the BaBar simulations!

Hossein