

SiD Hadron Calorimeter simulation

Single pions

Varying energy threshold

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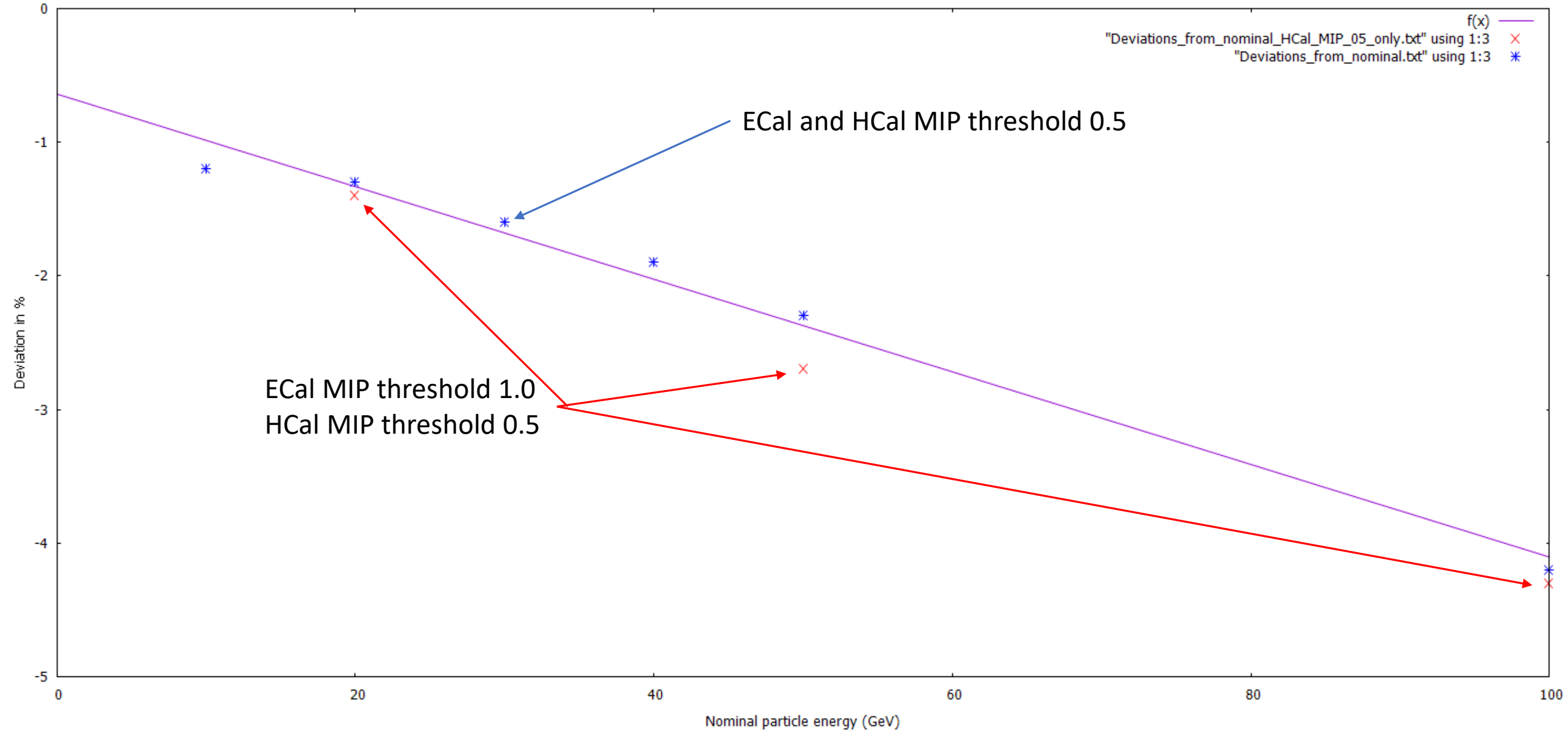
SiD Hadron Calorimeter - Digitization

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<!-- digitisation for scintillator HCAL barrel hits -->
<processor name="HCalBarrelDigi" type="RealisticCaloDigiScinPpd">
  <parameter name="inputHitCollections"> HCalBarrelHits </parameter>
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  <parameter name="outputRelationCollections"> HCalBarrelDigiRelation </parameter>
  <parameter name="threshold"> 0.5 </parameter>
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  <parameter name="timingCorrectForPropagation"> 1 </parameter>
  <parameter name="timingWindowMin"> -10 </parameter>
  <parameter name="timingWindowMax"> 100 </parameter>
  <parameter name="calibration_mip">0.0004825</parameter>
  <parameter name="elec_noise_mip"> 0.1 </parameter>
  <parameter name="elec_range_mip"> 500 </parameter>
  <parameter name="CellIDLayerString"> layer </parameter>
  <parameter name="ppd_mipPe"> 15 </parameter>
  <parameter name="ppd_npix"> 1600 </parameter>
  <parameter name="ppd_npix_uncert"> 0 </parameter>
  <parameter name="ppd_pix_spread"> 0 </parameter>
  <parameter name="Verbosity" type="string"> WARNING </parameter>
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Minimum signal level

Deviation of fitted mean energy from nominal vs. threshold

Nominal	Fit mean	% deviation	
10	9.37	-6.3	Threshold 1.0
20	18.86	-5.7	
30	28.29	-5.7	
40	37.71	-5.7	
50	47.03	-5.9	
100	92.48	-7.5	
10	9.88	-1.2	Threshold 0.5
20	19.75	-1.3	
30	29.53	-1.6	
40	39.23	-1.9	
50	48.86	-2.3	
100	95.85	-4.2	



SiD Calorimeter Calibration

- Lowering MIP threshold improves correspondence between nominal and reconstructed energies.
- Some improvement in energy resolution.
- Mean vs. nominal shows linear deviation as function of energy – correction?
- Keeping ECal MIP threshold at 1.0 adds slightly more deviation from nominal.
- Adjust “MIPGeV” parameter value in reconstruction?