Response of a Close to Final Prototype for the PANDA Electromagnetic Calorimeter to Photons at Energies below 1 GeV

PROTO60: First step to the final design of the barrel EMC

- 60 tapered lead tungstate (PWO) crystals
- readout: single LAAPD (1 cm$^2$ quadratic)
- low-noise low-power preamplifier
- operating at -25 °C

Higher order energy correction

- significant loss and leakage inbetween crystals
- correcting deposited energy with $\ln(E_1/E_2)$-method

<table>
<thead>
<tr>
<th>Energy of PROTO60 in GeV</th>
<th>Counts per 10 MeV</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>500</td>
</tr>
<tr>
<td>12</td>
<td>1000</td>
</tr>
<tr>
<td>13</td>
<td>1500</td>
</tr>
<tr>
<td>14</td>
<td>2000</td>
</tr>
<tr>
<td>15</td>
<td>2500</td>
</tr>
<tr>
<td>16</td>
<td>3000</td>
</tr>
</tbody>
</table>

Uncorrected  
Corrected  
Corrected EnergySum in x

C. Rosenbaum (JLU Gießen)
120 PWO crystals of the 3 most tapered types
close to final mechanics and cooling
readout: 2 LAAPDs per crystals (1cm$^2$ rectangular)
custom designed APFEL ASIC

Two channels with different gain for each LAAPD
Dynamic range of 10000 (1 MeV to 12 GeV)
Programmable amplification of 16/32
High rate capability (up to 500 kHz)
Low power consumption: 55 mW/ch

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