Weekly report

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Weekly report

- Photon reconstruction using ZDC
 - Ongoing. Not much to show...
- Collecting information for my JPS talk.

Photon requirement

• This is what I know:

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1	Target analysis	Origin of photon	ZDC usage	Energy range	Energy resolution	Position resolution	Note	
2	e+Pb J/Psi production	Pb de-excitation	Veto events with photon	100-300 MeV? (or 500 MeV?)			Which level of tagging efficiency is needed?	
3	u-ch exclusive pi0	pi0 decay	Tag 2 photons. Single photon is also useful.	20-40 GeV	45%/sqrt(E) + 7.5%?			
4	Lambda decay? (Kaon structure)	Lambda->n+pi0 ->2 gamma	Tag a neutron and 2 photons			0.5-1 mm??		
5								
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- Asked Bill (Diff. & Tagging expert in ECCE) for more information and revision last week.
- Further helpful info:
 - Distribution of the distance between 2 photons from pi0.

Photon energy reconstruction

- ZDC needs to measure multiple photons in an event.
 - \rightarrow Use RoI for photon reconstruction.
- Strategy:
 - Form a cluster of 3x3 towers on the first crystal layer.
 - Set Rol on the following layer.
 - 3.3 cm x 3.3 cm RoI for the Pixel 1
 - \rightarrow for the position reconstruction.
 - 5x5 towers for the second crystal layer.
 - 15 cm x 15 cm Rol (tentative) for W/SI
 - Sum up the energy in the Rol.
 - Energy deposits in Crystal is smeared for the resolution.
 - Energy deposits in W/SI silicon layers are scaled by 82.7 for the sampling fraction.
- Ongoing. No plots to show today.



Resolution of PbWO₄ calorimeters

- CMS ECAL
 - PWO-I
 - Beam test: $\sigma_E/E = 2.8\%/VE \oplus 0.125 \text{ GeV/E} \oplus 0.3\%$ (E in GeV)
- PANDA EMC
 - PWO-II: higher light yield than PWO-I, but should be operated at -25°C
 - 1.54%/VE [GeV]+0.3%
 - Beam test:



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 Table 1. Characteristics of PWO-I and PWO-II crystals [4]

Characteristic	PWO-I (CMS)	PWO-II (PANDA)
La, Y concentration level (ppm) Light yield of full size (20cm) crystal with PMT-readout at room temperature (phe/MeV)	$ \begin{array}{r} 100 \\ 8 - 12 \end{array} $	$ \begin{array}{r} 40 \\ 17 - 22 \end{array} $
Light yield temperature coefficient at $T = +20^{\circ}$ C (%/K) EMC operating temperature (°C)	$\begin{array}{c} -2.0 \\ +18 \end{array}$	$-3.0 \\ -25$

➔ In my study: Smear E_{dep} in a crystal cluster by 2.5%/VE [GeV] + 1 %

