How Things Are Going

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Modeling SuperBaBar Calorimeter in Pravda MC

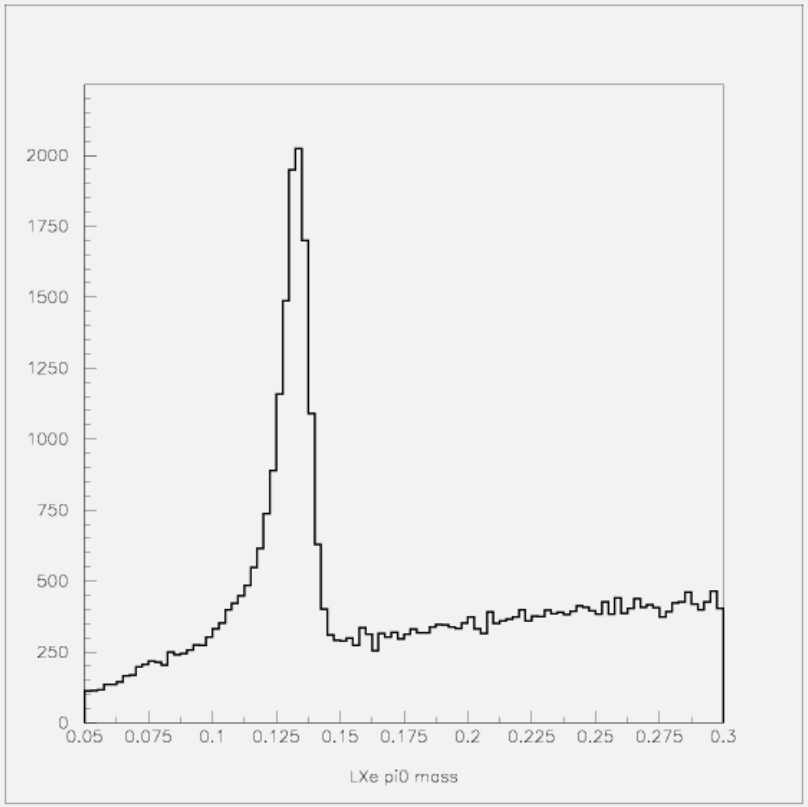
- CsI(Tl) calorimeter is has too slow a resonse for 10^{36} . Need a faster material.
- A few options have been proposed:
  - $PbWO_4$
  - LSO
  - lXe (as scinilator)
- Need Pravda MC to study Physics efects
- Due date: May (but sooner better)

Pravda MC

- Parameterised MC
- Very fast: entire BaBar data set in ~1 day
- Cannot tell you what performance will be, but given a proposed performance can be used to study effect on Physics
- Nicely written, easy to mess with
- Not yet complete: missing merged pi0s

$PbWO_4$

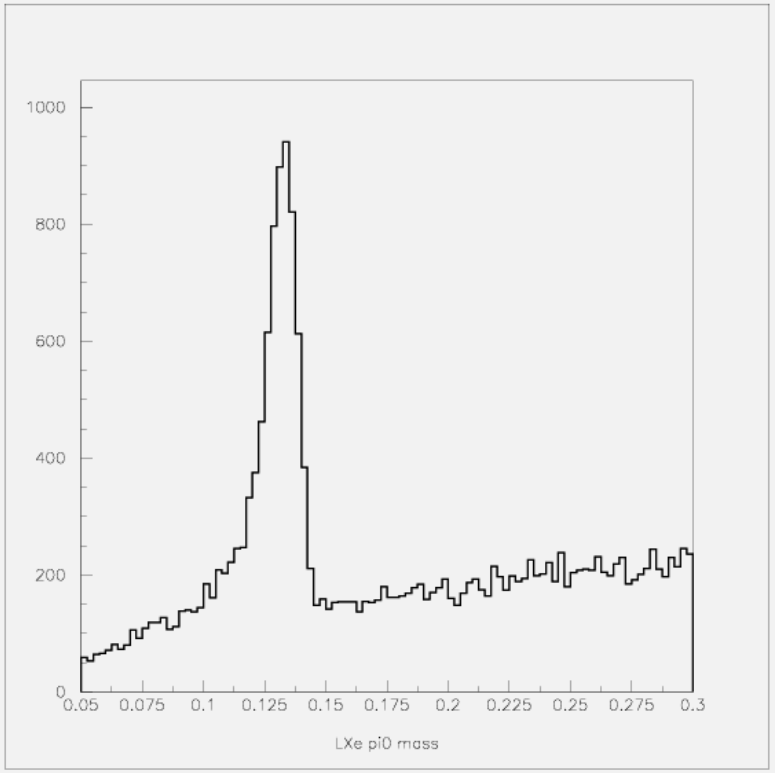
- Crystal calorimeter
- Fast scintilation (~100ns)
- Already in use by other experiments (CMS)
- Much denser than CsI (shorter radiation length, Moliere radius)
- Much worse light yeild



pi^0 mass (B^0)

LSO

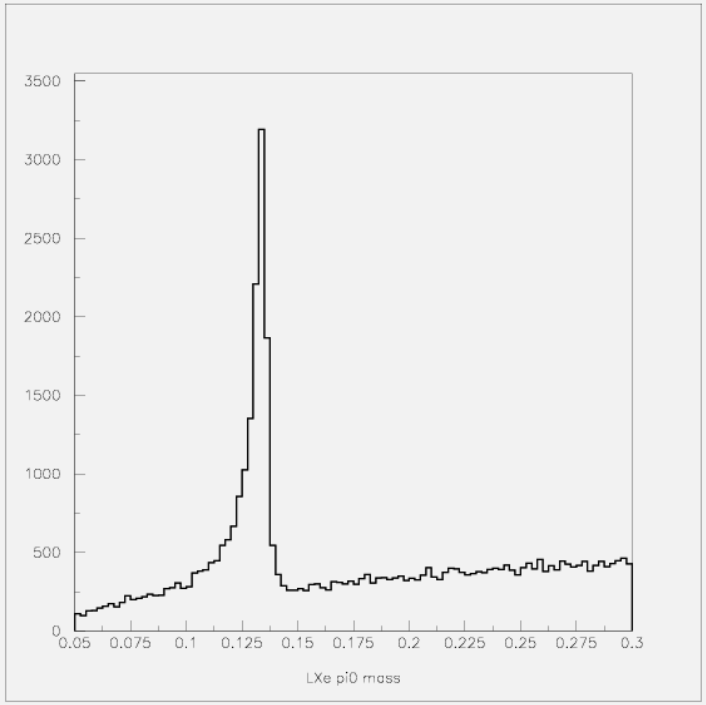
- Crystal Calorimeter
- Very fast scintilation
- Never used by HEP before. Only references from medical physics journals
- Denser, shorter radiation length
- Light yeild worse than but comparable to CsI(Tl)



pi^0 mass (B^0)

LXe

- Using Scintilation for Calorimetry
- Emits in UV – needs wavelength shifting
- Light yeild is OK
- Potential for novel features
  - Longitudinal shower shape
  - Charge collection at front of calorimeter – mm resolution for high energy gammas



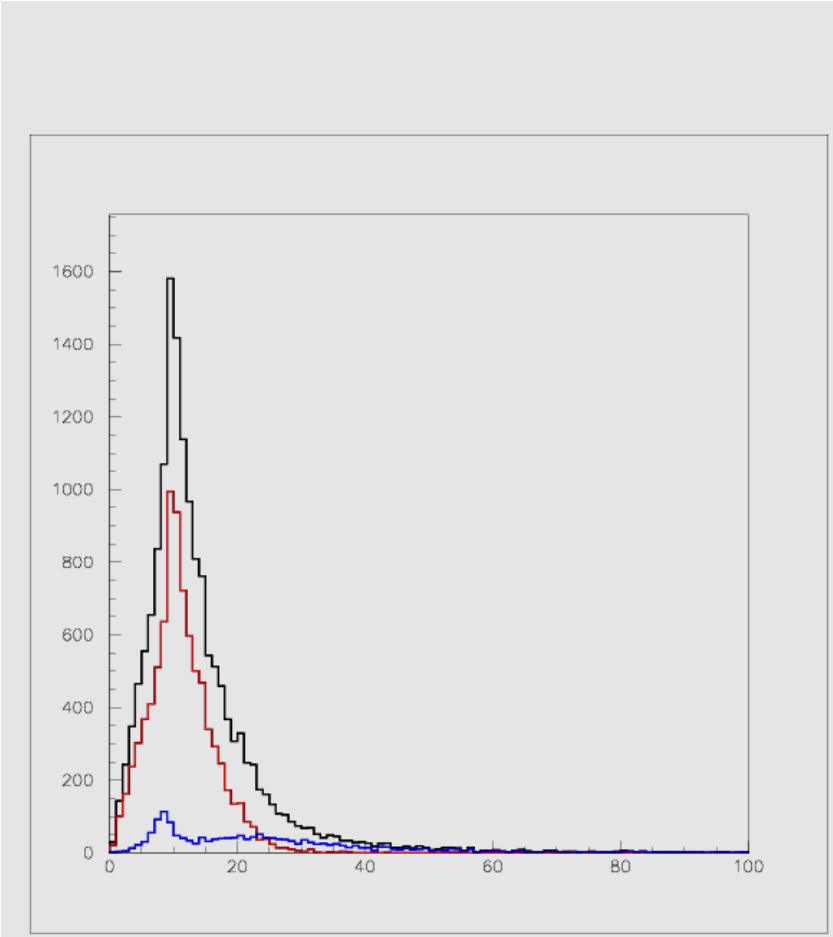
pi^0 mass (B^0)

Merged pi^0s

- At the moment, even 2 photons directly on top of each other are seen as separate objects in Pravda
- Start with true pi^0s, assign probability of merged, unmerged according to seperation
- Form merged pi^0 lists according to efficiency and fake rate (from photons) of selection (data from thingy)

Merged pi^0: p(merged)=

- Using B^0->pi^0pi^0 MC
- Needs custom truth matching
- All Pi0
- Two Bump
- Single Bump



Plans

- Will release 1st version of calorimeter models next week.
- Have been asked to look after DIRC too (performance ~ not changing).
- Have a rough solution to the merged pi0 problem – better than nothing right now.
- Starting to think about analysis.