Subject: LYCCA ToF scintillators
Posted by a_boso on Wed, 07 Oct 2015 08:09:48 GMT
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Dear all,

I am trying to use ToF Start scintillator to get position informations.

Looking at the code I saw the possibility to use a "x_shear" parameter, which permits to introduce a "y-dependent" offset on the x position.
Which is the physical meaning of this quantity? How can I optimize it?

More generally, do you know how can I optimize the position information of the Lycca ToF scintillators? Which resolution should I expect?

Last question:

Could you please share the positions of the PMTs you have in the Lycca/Lycca/Membrane.par file for the ToFStart and ToFStop scintillators?
I have more than one set, and I don't know which one is the right one.

Thank you very much!

Alberto

Subject: Re: LYCCA ToF scintillators
Posted by Michael Reese on Fri, 12 Aug 2016 13:35:22 GMT
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Hi,

By just plotting the x vs. y position as it comes from the ToF-scintillator, you will get a pattern of squares. The pattern comes from the gaps between the LYCCA modules.
If everything would be perfect, the lines in the pattern should be perpendicular. In practice they might look a bit sheard.
The "x_shear" and "y_shear" parameters are there to correct for that.

I hope the following schematic drawing makes it clear.

In addition, the pattern might be shifted in x and y direction, and rotated. There are other parameters forseen to correct these errors.

Regards,
Michael

File Attachments
1) shear_correction.png, downloaded 370 times

Subject: Re: LYCCA ToF scintillators
Posted by SMilne on Fri, 12 Aug 2016 14:26:53 GMT
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Hi Michael,

Could I please ask how this calibration would likewise be performed for the ToF start scintillator, i.e. where no such lines are present.

Thanks,
Scott

Subject: Re: LYCCA ToF scintillators
Posted by Michael Reese on Fri, 12 Aug 2016 15:20:20 GMT
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Hi,

You need to create a pattern artificially. One possible way to do this is to draw a rectangular gate around the projected TPC-position, i.e. the "true" position, and make a gated ToF x:y plot with the condition that the "true" position is inside that gate. You'll see the distorted shape of whatever gate you have drawn.

Reminder of how to create such a rectangular gate in the config file (I didn't test that piece of code... there might be typos inside):

```
processor ToF_Start/TPC/gate UTILS.ConditionWindow2D
  x  <-  Frs/S4tracking.xs[5]
  y  <-  Frs/S4tracking.ys[5]
  display x:y | xy_window
end

processor ToF_Start/distored UTILS.PairWithCondition
  first  <- Lycca/ToFStart/Membrane.x
  second <- Lycca/ToFStart/Membrane.y
  condition <- ToF_Start/TPC/gate.inside
  display tested_first:tested_second
end
```

If you want to have multiple gates, you could do something like this for 6 gates:

```
for $i in [0:5]
  processor ToF_Start/TPC/gate_$i UTILS.ConditionWindow2D
    x  <-  Frs/S4tracking.xs[5]
    y  <-  Frs/S4tracking.ys[5]
    display x:y | xy_window
  end
end

processor ToF_Start/distored UTILS.PairWithCondition
```

```
  first  <- Lycca/ToFStart/Membrane.x
  second <- Lycca/ToFStart/Membrane.y
  for $i in [0:5]
    condition <- ToF_Start/TPC/gate_$i.inside
  end
  display tested_first:tested_second
end
```

Then you could draw gates in the shape of horizontal lines, three gates in the shape of vertical lines, and together they'll make a grid-like shape.

Subject: Re: LYCCA ToF scintillators
Posted by Michael Reese on Fri, 12 Aug 2016 15:27:20 GMT
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I should mention, that all these corrections should be done after the calibration of the PMTs is already optimized.
Calibrated PMTs will already give a good x:y pattern. The offset, rotation, and shear corrections are for fine-tuning the result.

Subject: Re: LYCCA ToF scintillators
Posted by SMilne on Fri, 12 Aug 2016 15:32:10 GMT
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Hi Michael,

Thanks for your response. I will give it a try and see what I get.

Yeah, the other calibrations are already completed, this was just to try and optimise them a little more.

Thanks,
Scott
