

## Analysis - Bug #1961

### 2016 LiH geometry issues

21 March 2018 12:14 - Rajaram, Durga

<b>Status:</b>	Open	<b>Start date:</b>	21 March 2018
<b>Priority:</b>	High	<b>Due date:</b>	
<b>Assignee:</b>	Rajaram, Durga	<b>% Done:</b>	0%
<b>Category:</b>		<b>Estimated time:</b>	0.00 hour
<b>Target version:</b>			
<b>Description</b>			
There seem several issues in the 2016/04 geometry that potentially affect the scattering analysis.			
<ul style="list-style-type: none"><li>• The empty LiH volume description has the empty LH2 vessel in place</li><li>• There is extraneous material -- vacuum windows -- in the lih geometry (<a href="#">#1951</a>)</li><li>• The diffuser material description is incorrect (wrong Tungsten)</li><li>• The LiH density is incorrect</li></ul>			

### History

#### #1 - 21 March 2018 12:19 - Rajaram, Durga

Re the density, both the scattering analysis note & the LiH note list the density as 0.694 g/cc. But the Disk\_LiH.gdml geometry prior to June 2016 lists the density as 0.78 g/cc

#### #2 - 21 March 2018 15:23 - Rajaram, Durga

In the 2016 geometry, the absorber is placed within the AFC with a rotation of 25mrad (x) 52 mrad(y)

We took these rotations out in the recent geometry uploads. Do you want me to do the same? Or leave it as is?

#### #3 - 22 March 2018 12:06 - Rajaram, Durga

Also, to fix:

- Diffuser iris order is incorrect will result in the wrong iris being opened/closed in the geometry.
  - This was fixed for later geometries

#### #4 - 23 March 2018 11:38 - Rajaram, Durga

Fixes are in preprod:

- the empty LiH volume description now refers to Disk\_LiH-Empty.gdml -- has only mylar foils, no LH2 support structure
- removed lh2 support structure from LiH geometry
- diffuser tungsten material defined correctly, brass density corrected, diffuser iris ordering fixed
- LiH density is now consistent with MICE notes
- loaded updated alignment corrections from Francois
- added virtual planes for global track matching

Outstanding issue:

- the absorber is placed within the AFC with a rotation of 25mrad (x) 52 mrad(y). Per Chris's suggestion these were taken out in recent geometry cleanups. Should the same be done for the Feb/March 2016 geometries?

#### #5 - 23 March 2018 14:34 - Rajaram, Durga

- File lih-empty-7693-materials.png added

- File lih-7785-materials.png added

Attached plots to illustrate the current absorber geometry & rotations

#### #6 - 23 March 2018 14:47 - Rogers, Chris

Rajaram, Durga wrote:

Attached plots to illustrate the current absorber geometry & rotations

I think it is clearly not physical? All of the absorbers appear to have a weird, default, 20 mrad misalignment. Is there any reason to think this is physical?

**#7 - 23 March 2018 15:17 - Rajaram, Durga**

No, I don't think so. Which is why we removed it.

But it's one more change with impact on analysis and want to make sure John is aware of it and ok with taking out the rotation  
If you agree, I'm happy to take it out and start reco.

**#8 - 23 March 2018 17:02 - Nugent, John**

Hi Durga,

1. we discussed the density issue by email. As mentioned the Note is the most up-to-date information that I have if the geometry is consistent with that then I am satisfied.

2. I do not have any information on the absorber placement. I would have to defer to whatever CAD drawings were produced or notes left by the team that installed it. Thanks for making me aware of this change. You say these were taken out of the most recent uploads, was this for running periods after 2015/04? What was it that prompted the change? Unless there was a specific reason for the geometry being in two different configurations then I would make the 2015/04 geometry absorber placement consistent with the others.

3. All of the diffuser rings are removed for the field off analysis so thanks for letting me know but I don't think this should be an issue.

Thanks for investigating all of the geometry issues. I am happy that all of the changes discussed at the referees meetings are in so once the last changes are in if you could start the reco that would be great.

Cheers,  
John

**#9 - 23 March 2018 17:08 - Rajaram, Durga**

2. I do not have any information on the absorber placement. I would have to defer to whatever CAD drawings were produced or notes left by the team that installed it. Thanks for making me aware of this change. You say these were taken out of the most recent uploads, was this for running periods after 2015/04? What was it that prompted the change? Unless there was a specific reason for the geometry being in two different configurations then I would make the 2015/04 geometry absorber placement consistent with the others.

As Chris says, it's just not physical so we decided to take out the seemingly arbitrary rotations of the absorber volumes.

I had done this for all geometries > June 2016

So, I will do do the same for your Feb/March geometries - both empty & lih. When you re-analyze, just be aware that this is another change

**#10 - 23 March 2018 17:20 - Nugent, John**

Cheers Durga, will do much appreciated.

**#11 - 23 March 2018 17:45 - Rajaram, Durga**

Took out absorber rotations & pushed geometries to production CDB.

Empty LiH starting from 7620 --> ID = 215 (was 168)

LiH starting from 7709 --> ID = 216 (was 165)

Will run data reprocessing on Feb/March runs over the weekend. Should be on reco.mice by Monday morning.

**#12 - 25 March 2018 16:42 - Rajaram, Durga**

Data reprocessing is done.

Includes global track matching.

Available from reco.mice

Please report if you find any issues

**#13 - 25 March 2018 16:43 - Rajaram, Durga**

Note: the runs I processed are the ones listed in Note-497 -- excluding the 'wrong' ones. If I've missed something, let me know.

**#14 - 03 May 2018 09:55 - Nugent, John**

- File refG4\_MCLihMuon\_03200\_thetaY\_sys.eps added

- File refG4\_4LihMuon\_03200\_thetaY\_sys.eps added

Hi,

I thought that this issue was resolved with the new processing but unfortunately not. While the issue is improved by the new processing there remains an asymmetry in the raw LiH data plots. Curiously there is no asymmetry in the raw LiH MC plots. I have attached both to this item. Both are processed in an identical manner by the analysis so it seems strange to me that one has an asymmetry and the other does not.

Ignore the labels on the plots the data is processed with v3.1.2 (v2 for the empty channel data) and the MC is v3.0.1. The data has the geometry fixes disussed in this thread in while the MC does not. Durga, could any of the geometry fixes or alignment corrections account for this is the latest processing? I am trying to account for why there is a difference between the two.

I am now going to simply rotate the tracks in data to remove the asymmetry as I believe this is the most expedient way to overcome this issue. Durga, I understand that you have already devoted some time to this but if you could point me towards anything that I could chase up regarding the MC/Data comparison it would be very helpful.

Cheers,  
John

#### Files

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lih-empty-7693-materials.png	13.8 KB	23 March 2018	Rajaram, Durga
lih-7785-materials.png	15.2 KB	23 March 2018	Rajaram, Durga
refG4_MCLihMuon_03200_thetaY_sys.eps	16.4 KB	03 May 2018	Nugent, John
refG4_4LihMuon_03200_thetaY_sys.eps	17.2 KB	03 May 2018	Nugent, John