

ACD Planning January 2006

Geometry

Status:

- The tile and ribbon dimensions were obtained from the ACD engineers last summer. Joanne updated all dimensions to account for shrinkage at operating temperature.
- Overlap of top tiles (post-DC2)
Updated to go in the correct direction (thanks Joanne). Consequence was that the modeling of the ribbons on the top was modified causing the need to update some code in AcdRecon and AcdUtil.
- Curvature of the top tiles has been implemented in a more recent tag of xmlGeoDbs (thanks Joanne) (also post-DC2)
[pretty picture](#)
Note that this includes a small piece of ribbon that lives along the curvature of the top tiles.
This needs to be tested and the digitization and active distance calculations updated to accommodate the new volumes in the geometry.

To Do:

- Cross check the placement of the tiles and ribbons against the integration testing position maps.
Eric should have this data available soon if not already. In what form?
- Update Blanket/MMS
Dave Thompson has provided the final numbers in a PDF file.
Currently the blanket/MMS is simulated as a single layer of cooked up material as setup back for the AO. Joanne and Heather will be updating the dimensions and material to conform to the new values. What is the crown?
- Screws
Typical tiles have four iron screws each, the bottom row large tiles have 20 (I think). Much work went into this before DC2. However, there were problems in how the volumes associated with the screws were handled by the simulation. Joanne has volunteered to address this again and basically start from scratch.
- Shingling
Work on this has not yet been scheduled.
- No plans for modeling flexures, BEA, or updating the simulation of the support material.

Digitization

Any ACD detector with at least one PMT reaching zero suppression threshold, aka low threshold, aka 0.1 MIPs is stored on the TDS and ultimately in the output ROOT files - this collection forms the AcdDigiCol.

Please note that TriggerAlg was recently updated (as of v4r3p2) such that veto threshold (0.3 MIP default) is utilized in determining ACDLO in the GltWord. *This modification was not included in DC2 as agreed*

Status

Fiber attenuation on a per PMT basis was achieved in time for DC2.

To Do:

- Ribbon Attenuation
Alex has provided mean PE per MIP for an average ribbon at various positions.
- What plans are there to store mean PE per MIP per PMT as a calibration? Values from GSFC tests are currently stored in XML in the AcdDigi package.
- Revisit CNO calculation.
- Revisit noise calculation.
- Implement readout limitations - accept and hit maps contain enough bits for 18 channels.
- Utilize the AcdGeometrySvc throughout digitization and reconstruction for consistency.

Calibration

Status

calibGenACD can now produce:

- Pedestals output to XML
- MIP Peak values output to XML

To Do

- Create AcdCalibSvc building off of Joanne's Calibration infrastructure which initially will serve the creation of AcdHits in AcdRecon.
- Consider further necessary calibrations: VETO settings, ribbon light attenuation, loss near tile edges...
- CNO calibration

Reconstruction

Considers all ACD detectors present in the AcdDigiCol, irrespective of the setting of the veto discriminator (hit map bit). This has been confirmed with Bill who explains that we are interested in background rejection at this level and desire to utilize all information available.

Status

- AcdTkrIntersection
Projection of each track returned by TkrRecon to the ACD tile expected to be hit (whether or not a hit was registered in the AcdDigiCol)
- AcdHit collection
AcdDigs with an additional piece of data: calibrated MIP values per PMT
- AcdPoca (Point of Closest Approach)
[Eric's talk from Dec 16 2005](#)

To Do:

- Update Active Distance calculations to handle updates to the geometry, include curvature of the top tiles.
- Extend AcdTkrIntersection to utilize a proximity map to determine "near" hits
- Add Ribbon DOCA to AcdValTools
utilize list of track intersections and knowledge of geometry for calculations in AnaTup
- Remove old DOCA and original Active Distance calculations and their ntuple entries.
We will eliminate the following summary ntuple variables: *AcdDoca*, *AcdDocaTileEnergy*, *AcdGammaDoca* and their siblings located in the recon. root files.
- Add TkrIntersection quantities to the summary ntuple
Suggested names?
Should check that what has propagated into SVAC ntuple has a cousin in the summary ntuple if desired.
- Update Ribbon Active Distance calculation
Currently views ribbons as lines

System Tests

Status

Update generic set of ACD plots by removing old items such as DOCA and add in new variables of interest such as AcdCornerDoca an initial pass is already completed.

Add new sources

- Illuminate full top with normally incident muons.
- Illuminate full X side with normally incident muons
- Illuminate full Y side with normally incident muons
- Noise source which doesn't hit the instrument at all

To Do:

- Add a series of ACD specific systests to exercise the geometry, digitization and reconstruction.
Already received a few ideas from Bill.
Illuminate top/sides with patch sources to check location of gaps in the simulated geometry.
Similar sources could be used to show how well the digitization algorithms are working.
We need these benchmarks in place before serious updates to the digitization code begins.

Documentation

To Do

Update reconRootData description to include AcdHit, AcdPoca, AcdTkrIntersection
Update digiRootData description to include the latest methods in AcdDigi.