

-- KathrynGrimm - 2016-11-29

Notes on Statistics

NotesOnStatistics

Slides from Summer Lectures: <https://indico.cern.ch/event/634036/>

Notes on Vertex Reconstruction

Track requirements for vertex reconstruction:

<http://acode-browser2.usatlas.bnl.gov/lxr-rel20/source/atlas/InnerDetector/InDetExample/InDetRecExample/python/C>

Seeding When the Beam Spot is available then vertices are seeded using the ZScanSeedFinder. When no beam spot is available then the CrossDistancesSeedFinder is used. This is configured with the python flag "InDetFlags.doPrimaryVertex3DFinding()". If this is true, then the Cross Distances seed finder is setup, otherwise, the ZScan seedfinder is used. This is configured in the job option:

<https://svnweb.cern.ch/trac/atlasoff/browser/InnerDetector/InDetExample/InDetRecExample/trunk/share/InDetRecLoa>

The doPrimaryVertex3DFinding() flag itself is configured here:

<http://acode-browser.usatlas.bnl.gov/lxr/source/atlas/InnerDetector/InDetExample/InDetRecExample/python/InDetJob>
The 3DFinding flag is true by default, but if the flag InDetFlags.useBeamConstraint() is true, doPrimaryVertex3DFinding() is changed to false.

The useBeamConstraint() flag, in turn, is true by default, but set to false for certain processing streams in this script (it is set to false for the Express stream, for instance).

The vertex "finding" configuration: In pp running multiple vertices are allowed. All tracks are used to find as many vertex candidates as possible. In Heavy Ion running only one vertex is allowed-- a single candidate is formed from all tracks.

In the finder tool the beam spot constraint is applied:

<https://svnweb.cern.ch/trac/atlasoff/browser/InnerDetector/InDetRecTools/InDetPriVxFinderTool/tags/InDetPriVxFin>

Fitting The standard proton-proton PV reconstruction uses the Adaptive Vertex Fitter. It is a full Kalman filter with re-weighting. It gives high precision and high resolution, especially at low number of tracks. Requires more CPU time than e.g. the Heavy Ion Fast Billoir fitter. May not converge on a vertex with few thousands tracks within allowed number of iterations. (Info from kirill)

For HI running the FastBilloir fitter is used. "Moderate resolution at low number of tracks, linearization assumption applied on trajectories, very fast."

The formation of a single vertex candidate can happen via two methods: Heavy Ion uses: Chi2Method=1: All tracks incompatible with initial seed are rejected, the remaining tracks are fitted to a single vertex candidate, this candidate is returned to the user. Proton Proton uses: Chi2Method=2: Tracks are removed one by one starting from the least compatible one. At each iteration the vertex candidate is re-fit and track compatibility is re-evaluated.

The Vertex Container

Relevant vertex quantities: root [4]

CollectionTree->Scan("PrimaryVerticesAux.x[0]:PrimaryVerticesAux.covariance[0][0]:PrimaryVerticesAux.numberD

Vertex Types are defined here:

<https://svnweb.cern.ch/trac/atlasoff/browser/Tracking/TrkEvent/TrkEventPrimitives/trunk/TrkEventPrimitives/VertexT>

JIRA Tickets

High HT Events with Unmerged Nearby PVs: <https://its.cern.ch/jira/browse/ATLIDTRKCP-87>

Size-Reduced AODs: <https://its.cern.ch/jira/browse/DATREP-80>

Monitoring and Validation Software

Graham's updated tool:

<https://svnweb.cern.ch/trac/atlasoff/browser/InnerDetector/InDetValidation/InDetVertexValidation>

InDetGlobalMonitoring/InDetGlobalPrimaryVertexMonTool

<https://svnweb.cern.ch/trac/atlasoff/browser/InnerDetector/InDetMonitoring/InDetGlobalMonitoring/trunk/src/InDetG>
= Used in:

<https://svnweb.cern.ch/trac/atlasoff/browser/InnerDetector/InDetExample/InDetRecExample/trunk/share/InDetMonitor>

Presentations on the Split Vertex Method from Sarah Boute:

26, Sept 2014

https://indico.cern.ch/event/295469/contribution/0/attachments/553859/763088/splitvertex_250914.pdf

22 Jan:

https://indico.cern.ch/event/366773/contribution/0/attachments/728989/1000269/splitvertex_220115.pdf

9 April:

https://indico.cern.ch/event/366784/contribution/0/attachments/729012/1000295/splitvertex_090415.pdf

23 April

https://indico.cern.ch/event/366786/contribution/1/attachments/729016/1000299/splitvertex_230415.pdf

8 May

https://indico.cern.ch/event/393249/contribution/7/attachments/786887/1078633/splitvertex_IDTP_080515.pdf

Sample dependence:

https://indico.cern.ch/event/366788/contribution/1/attachments/729020/1000303/splitvertex_070515.pdf

Information on Upgrade Tracking Studies

Vertex ideas from Dave June 2017:

https://indico.cern.ch/event/644782/contributions/2617854/attachments/1473267/2280561/UpgradeVertexIdeas_07Jun

Vertex Talk at XXIX IUPAP Conference on Computational Physics, Paris, France, 9 - 13 Jul 2017

<https://cds.cern.ch/record/2273572/files/ATL-COM-SOFT-2017-038.pdf>

Timing Detector:

https://indico.cern.ch/event/612694/contributions/2469924/attachments/1410303/2156813/physcisupgrade_cern_Feb9

https://indico.cern.ch/event/624321/contributions/2625309/attachments/1476059/2286741/HGTD_June_Ariel_v6.pdf

ITK Layout Task Force Document:

<https://cds.cern.ch/record/2239573/files/ATL-COM-UPGRADE-2016-042.pdf>

Strip TDR: <https://cds.cern.ch/record/2239048/files/ATL-COM-UPGRADE-2016-040.pdf>

Examples for html:

$\sqrt{s} = 8 \text{ TeV}$ $21 < \mu < 23$.

Position ((a) x_L , (c) y_L , (e) z_L) and size ((b) x , (d) y , (f) z)

Z $\mu\mu$ $p_T > 15 \text{ GeV}$

This topic: Sandbox > KathrynGrimmSandbox

Topic revision: r14 - 2022-07-20 - KathrynGrimm



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