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General LHCb Tracking Wiki Page

Run 1-2 Performance WG

The tracking & alignment WG has been merged with the PID&CO WG to form the Run 1-2 Performance WG. Please refer to Run12Performance twiki page.

Meetings

Minutes of meetings

- T&A Meeting, May 3, 2018 [↗](#)
- T&A Meeting, March 15, 2018 [↗](#)
- T&A Meeting, January 18, 2018 [↗](#)
- T&A Meeting, January 30, 2018 [↗](#)

- Minutes of past meetings: LHCbInternal.MinutesTA_2016
- Minutes of past meetings: LHCbInternal.MinutesTA_2016
- Minutes of past meetings: 2015

Tracking for 2016

Follow this link for detailed information on TrackingFor2016.

(not up-to-date anymore: TrackingFor2015).

Tracking efficiency results

See the LHCbTrackingEfficiencies pages.

Reconstruction version

- What are the changes and features in the different Reco versions
- Ghosts in Reco13 / getting the "Reco13e" on older datasets
- Useful information in Tracking reconstruction

Release schedule

The schedule for releases of the LHCb software can be found here

Refit tracks in DaVinci (including momentum scale calibration)

See the links RefitTracksFromDST.

this includes pointers to the tools for

- track refitting
- updating stripping candidates using new trackfits or momentum scale calibration
- the momentum scale calibration tool

Open tasks

See link to the [TrackingTaskList](#).

Liaisons

See link to [TrackingAlignmentLiaisons](#)

Conferences

There are a few conferences of interest for people working on tracking, alignment and vertexing:

- EPS 2017, 5-12 July 2017 [↗](#), Venice, Italy, two abstracts sent
- ACAT 2017, 21-25 August 2017 [↗](#), University of Washington, Seattle, US, abstract deadline: 29 April 2017
- IEEE NSS 2017, 21-28 October 2017 [↗](#), Atlanta, US, abstract deadline: 8 May 2017
- Vertex 2017, Las Caldas, Asturias, Spain, abstract deadline: to be defined

If you are interested in any of these or you want to suggest a conference we've missed, please get in touch with us!

Previous Talks/Posters & Proceedings

A list of talks recently given at detector and software conferences can be found at [this page](#).

Plots for conference

Useful figures to describe tracking and alignment development and performance [page](#).

Submitted Abstracts

A list of abstract submitted to conferences in the past can be found at [this page](#).

Performance Plots

Summer 2015 (50ns ramp up):

- Performance of Ghost probability / fake track rejection Cut at ghost probability < 30%.
- Velo alignment
- Tracker alignment (vs Iteration), Tracker alignment (vs Fill)

Summer 2010:

- plots are [here](#) [↗](#), explanations are [here](#) [↗](#)
- VELO performance plots from the velo group can be found [here](#) [↗](#)
- ST performance plots from the ST group can be found [here](#) [↗](#)

Tracking Strategy

Multi-pass tracking finding and fitting:

- VELO track finding in 3D (since 2011: FastVelo)
- Forward tracking: extension of the 3D VELO tracks to the T seeding stations (PatForward)
- Seeding in the T stations (until 2010: TsaSeeding, since 2011: PatSeeding) (optional: run only on hits which haven't been used by PatForward. this option is OFF by default)
- Matching of VELO and seed tracks (until 2010: TrackMatching, since 2011: PatMatching)
- Downstream KShort tracking: tracks with hits in the TT and T stations (PatDownstream) (optional: run only on seed tracks which haven't been used in match tracks. this option is OFF by default) Since Run II, 25ns: PatLongLivedTracking
- Upstream tracking: tracks with hits in the VELO and the T station (VeloTTHybrid since Run II).
- Making of the set of "best" tracks with removal of track clones (until Reco13: TrackEventCloneKiller, since Reco13a: TrackBestTrackCreator)

The whole of the tracking strategy that is run in the Brunel reconstruction program is defined in the options file RecoTracking.py (RecoTrackingRun2.py in Run 2) in the Tf/TrackSys package (link to Tf/TrackSys [in the gitlab repository](#)).

A more detailed description of the tracking strategies and pattern recognition algorithms used is also available.

PV Fitting

Please refer to the dedicated page.

Track Fitting

Please refer to the dedicated page. For the simplified geometry used in the track fit, see this page.

Release notes and Performance Documentation

A web-page with the documentation of the relevant changes and the performance of the pattern recognition and the fitter for each release can be found here [in the gitlab repository](#). (Replace this, does not work anymore!)

Material description

Information about the material description

Useful Links

- **Alignment** wiki page
- **Links to software pages of the tracking sub-detectors:**
 - ◆ Outer Tracker (OT) software pages
 - ◆ Silicon Tracker (ST) software pages [in the gitlab repository](#)
 - ◆ VELO software pages
- **Brunel FAQ** Add your knowledge there
- **Physics Book** preparations: tracking contribution
- **Special Data Sets** for tracking studies
- **2004-05 Track Event Model Review:** wiki page on the track event model review that took place during end 2004 - 2005

Documentation at review stage in the Tracking & Alignment group

Tables keeping track of **internal notes, public notes and papers currently at review stage** can be found in the DocumentsReview page

Published papers on Tracking

- **"Measurement of the track reconstruction efficiency at LHCb"**, The LHCb collaboration, JINST 10 P02007 [↗](#)

LHCb Notes and Documentation on Tracking

DC06 documentation:

- **"Tracking definitions"**, Eduardo Rodrigues, LHCb 2007-006 [↗](#), 2/2007
- **"Performance of the LHCb Track Reconstruction Software"**, Matthew Needham, LHCb-2007-144 [↗](#), 1/2008
- See Physics Book preparations page

General documentation:

- **"Track simulation and reconstruction in LHCb"**, Jeroen van Tilburg, PhD thesis [↗](#), 10/2005
- **"Optimisation of the LHCb Detector"**, Rutger Hierck, PhD thesis [↗](#), 10/2003
- **"Reoptimized LHCb Detector, Design and Performance TDR"**, LHCC-2003-030 [↗](#), 9/2003
- **"Status of Reoptimization"**, LHCb-2003-006 [↗](#), 1/2003
- **"Track reconstruction in the LHCb experiment"**, Rutger van der Eijk, PhD thesis [↗](#), 9/2002
- **"LHCb Outer Tracker TDR"**, LHCC-2001-024 [↗](#), 9/2001

Pattern Recognition documentation:

- **"A study of spillover clusters and ghost tracks in the Silicon Tracker with 25 ns bunch spacing"**, Vincenzo Battista, Frederic Blanc, Maurizio Martinelli, Mark Tobin CERN-LHCb-INT-2016-010 [↗](#)
- **"VeloTT tracking for LHCb Run II"**, Espen Bowen, Barbara Storaci, Marco Tresch LHCb-PUB-2015-024 [↗](#)
- **"Parallel Hough transform on OpenCL for track detection in the LHCb VELO Pixel detector"**, Matthias Ebert, Daniel Hugo Campora Perez, Niko Neufeld, CERN-LHCb-INT-2014-037 [↗](#)
- **"The Seeding tracking algorithm for a scintillating detector at LHCb"**, Yasmine Amhis, Olivier Callot, Michel De Cian, Thomas Nikodem, Francesco Polci, LHCb-PUB-2014-002 [↗](#)
- **"Description and performance studies of the Forward Tracking for a scintillating fibre detector at LHCb"**, Yasmine Amhis, Olivier Callot, Michel De Cian, Thomas Nikodem, LHCb-PUB-2014-001 [↗](#)
- **"VeloUT tracking for the LHCb upgrade"**, Espen Bowen, Barbara Storaci, LHCb-PUB-2013-023 [↗](#)
- **"FastVelo, a fast and efficient pattern recognition package for the Velo"**, O. Callot LHCb-PUB-2011-001 [↗](#), 1/2011
- **"Revision of Adding TT Hits to Long Tracks"**, M. De Cian LHCb-INT-2010-020 [↗](#), 4/2010
- **"Update on Downstream Tracking"**, S. Stahl, S. Hansmann-Menzemer LHCb-INT-2009-032 [↗](#), 12/2009
- **"Fast T-Station Seeding for HLT1"**, J. Albrecht, M. Schiller LHCb-2009-012 [↗](#), 1/2009

- **"PatSeeding - A Standalone Track Reconstruction Algorithm"**, Olivier Callot, Manuel Schiller
LHCb-2008-042 [↗](#) 8/2008
- **"The Forward Tracking : Algorithm and Performance Studies"**, Olivier Callot, Stephanie Hansmann-Menzember LHCb-2007-015 [↗](#) 5/2007
- **"Identification of Ghost Tracks using a Likelihood Method"**, Matt Needham, LHCb 2008-026 [↗](#)
- **"Clone Track Identification using the Kullback-Liebler Distance"**, Matt Needham, LHCb 2008-002 [↗](#)
- **"Identification of Ghost Tracks using Neural Networks"**, Adrian Perieanu, LHCb 2007-158 [↗](#)
- **"Performance of the Track Matching"**, Matt Needham, LHCb 2007-129 [↗](#)
- **"Classification of Ghost Tracks"**, Matt Needham, LHCb 2007-128 [↗](#)
- **"Profiling the VELO Pattern Recognition And Vertexing Algorithms"**, Sophie Redford, LHCb-2007-117 [↗](#)
- **"VELO Pattern Recognition"**, David Hutchcroft, LHCb-2007-013 [↗](#)
- **"Generic VELO Pattern Recognition"**, Tomas Lastoviicka, LHCb-2007-002 [↗](#)
- **"Dealing with Clones in the Tracking"**, Eduardo Rodrigues, LHCb 2006-057 [↗](#), 11/2006
- **"Velo Pattern Recognition and readout thresholds"**, Olivier Callot, LHCb 2006-019 [↗](#), 5/2006
- **"Online Pattern Recognition"**, Olivier Callot, LHCb 2004-094 [↗](#), 10/2004 (covers Velo R and Space tracking, Velo-TT and Forward tracking)
- **"Velo tracking for the High Level Trigger"**, Olivier Callot, LHCb 2003-027 (covers first HLT implementation, now obsolete)
- **"The forward tracking, an optical model method"**, Olivier Callot, Maurice Benayoun, LHCb-2002-008 [↗](#), 2/2002

Track Fitting documentation:

- **"Multiple scattering in track reconstruction"**, M. Hess, LHCb-INT-2014-043 [↗](#), 11/2015
- **"Optimization of the track fit for the upgraded trigger"**, Agnieszka Oblakowska-Mucha, Tomasz Szumlak, LHCb-PUB-2014-030 [↗](#)
- **"Mass Resolution and Track Fit Performance"**, M. Needham, LHCb-2009-013 [↗](#), 01/2009
- **"Track refitting howto"**, E. Rodrigues, LHCb 2007-111 [↗](#), 08/2007
- **"The trajectory model for track fitting and alignment"**, E. Bos, M. Merk, G. Raven, E. Rodrigues, J. van Tilburg, LHCb 2007-008 [↗](#), 03/2007
- **"Performance of the LHCb 00 track fitting software"**, Rutger Hierk, et al., LHCb-2000-086 [↗](#), 08/2000

Magnetic Field documentation:

- **"Magnetic field map with 2014 measurements for the LHCb dipole magnet"**, Maxime Schubiger, Heinrich Schindler, Fred Blanc, et al, LHCb-INT-2015-034 [↗](#), 10/2015
- **"Updated magnetic field map"**, Maxime Schubiger, Tuesday meeting slides [↗](#), 03/2015
- **"2014 Magnetic field measurements"**, Heinrich Schindler, Rolf Lindner, et al., slides [↗](#) survey slide [↗](#) EDMS note [↗](#), LHCb week Sept 2014
- **"Improved magnetic field map with 2011 measurements for the LHCb dipole magnet"**, Jessica Prisciandaro, Fred Blanc, T. Nakada, LHCb-INT-2012-012 [↗](#), 03/2012
- **"New B field map"**, Jessica Prisciandaro, slides [↗](#), 05/2011
- **"Towards a new magnetic field map"**, Fred Blanc, Jessica Prisciandaro, slides [↗](#), 04/2011
- **"Field Map Parametrisation: Current Status"**, Anne Keune, slides [↗](#), 6/2010
- **"Field Map + Mass Studies"**, Geraldine Conti, Matt Needham, slides [↗](#), 6/2010
- **"Magnetic field measurements"**, Jeroen van Tilburg, slides [↗](#), 05/2010
- **"Magnetic Field Parametrisations"**, Anne Keune, Geraldine Conti, LHCb-INT-2010-002 [↗](#), 04/2010
- **Parametrisation of the LHCb magnetic field map**, Adlene Hicheur, Geraldine Conti, LHCb-2007-093 [↗](#), 12/2008

Software documentation:

- "Tracking in Python", Eduardo Rodrigues LHCb-2006-014 [↗](#), 05/2006

Tracking for upgrade

Details on the tracking efforts can be found here.

Details about Kalman Filtering for upgrade can be found here.

Tracking for Upgrade 2

Details of tracking studies for the 2031 upgrade can be found here

Archive

Old things that are listed here so they are not lost...

LHCbTrackingArchive

This topic: LHCb > LHCbTracking

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