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List of projects of the Tracking & Alignment group in 2017

This page aims to collect all the possible project for new people that would like to contribute to the T&A activity in 2017, especially in the first half of the year, in preparation of the data taking.

Open Tasks

Please feel free to contact Agnieszka Dziurda, Michel De Cian, Lucia Grillo for any question or to notify your availability.

To each task a priority is assigned, which is decided according to how much the specific work is needed and urgent and according to the number of other people that are involved in the area and could help with the work. Of course we would appreciate if all the tasks could be covered, *please if you are interested in a task contact us regardless the priority!*

Project (title)	Working Group production for Tracking Efficiencies evaluation
Description	<p>Unbiased and precise evaluation of the track reconstruction efficiency is one of the key ingredients for a plethora of LHCb analyses. One of our aims is to improve the tracking efficiencies calculation, moving to a more customizable, automatized and easier to be monitored procedure.</p> <p>This new approach, similar to the current procedure used for the PID efficiencies evaluation, is based on a set of user-friendly scripts, that can be run by any analyst using the choices more suitable to each measurement (e.g. the choice of the binning scheme), and a Working Group (WG) production of the samples (i.e. .root files) to be used as input for the users scripts. While the first part is covered, the implementation of the WG production would benefit from a person actively working on it. The job consists in the implementation, commissioning and validation of the WG production of the samples for the tracking efficiencies following, when possible and advisable, the PID model. Implementation of monitoring histograms to promptly detect any anomaly and validation of the full new tracking efficiency evaluation procedure should be achieved.</p> <p>Francesco Polci is willing to help and provide guidance in the development of this project, and the PID experts are available to provide any useful information and examples. The importance of this project is clear, as it will improve the procedure to obtain one of the most important physics performance measurements that is a key element in many physics analyses. Further more, becoming an expert of tools as the WG production would definitely be useful in the future, when the production of the data samples for physics will also move to a centralized model.</p>
Priority	high
Duration	4 months - to be ready by the beginning of 2017 data taking
Pre-knowledge needed	Basic knowledge of LHCb software and some experience in physics analysis (and being eager to learn something new)
Project (title)	LHCb performance with different beam conditions
Description	Variations of the LHC beams conditions such as the length of the bunches or the position of the luminous region, could possibly have an impact on the reconstruction performances of LHCb. To achieve a deep understanding of the performance of our track, vertex reconstruction and detector alignment, studies of performances in relation to the performance of the machine are needed. The outcome of the studies could be used to give feedback to the LHC experts and in some case as well to optimize or tune the reconstruction or the alignment

	and calibration procedures. It is important to evaluate the impact on beam conditions on "low-level reconstruction quantities, but if necessary, the study could include some simple physics analysis case.
Priority	medium
Duration	1-2 months
Pre-knowledge needed	Basic knowledge of LHCb software and some experience in physics analysis (and being eager to learn something new)
Project (title)	Implementation of improved monitoring system for Alignment & Calibration tasks
Description	<p>The real-time alignment & calibration strategy developed and used by LHCb RunII is one of the crucial ingredients to obtain an offline-quality reconstruction already at trigger level. As the real-time procedures directly affect the quality of the data we take, it is necessary to have the procedures constantly under control.</p> <p>To achieve this level of confidence, during 2015 and 2016 data taking a monitoring system for the OT online calibration, Velo and Tracker alignment has been put in place. However the monitoring of these tasks could be improved in several ways. It will be possible to move to a more efficient and stable monitoring framework developed by Roel Aaij and common with to the HLT monitoring. This will allow to make available all the relevant plots directly in Monet, simplifying the procedures for shifters, piquets and experts. In addition, it will be necessary to add monitoring functions to the tasks which will start to update the constants in real-time since 2017.</p> <p>A couple of experts from the alignment of the tracking system side (Giulio Dujany, Lucia Grillo) will work as well on this topic, it will certainly require the interaction with the different systems, Roel Aaij and HLT team.</p>
Priority	medium
Duration	3 months - to be ready by the beginning of 2017 data taking - specific timeline to be agreed
Pre-knowledge needed	Basic knowledge of LHCb software (programming geek can on the other hand express themselves)
Project (title)	Constraining the magnetic field map with the tracker alignment procedure
	<p>A sub-optimal description of the magnetic field would have a similar effect of a set of movements of the detector elements in the tracker alignment procedure. Our current track-based alignment procedure can detect variations of the magnetic field strength (variation between the real magnetic field and the description used in the reconstruction) as global movements of the detector, but not as variation of the field itself.</p> <p>This project consists in the implementation of a parametrized description of the magnetic field including few coefficients that could be determined in the alignment procedure, preliminary studies and in the validation of the procedure.</p> <p>A more flexible description of our magnetic field, that could describe the variations of the field itself and improve the description in the areas where the current map is not fully satisfactory is the first aim of this project. The best strategy to find variations of the magnetic field (i.e. determining global position and orientation with the alignment procedure and understand if/how to use additional information from track monitoring) needs to be studied and implemented.</p> <p>When the procedure is proved to work, it should be made available as special alignment configuration to be run during data taking in special cases (start of the data taking or when some possible issues with the magnetic field are detected).</p> <p>Pierre Billoir had the original idea and made a proof of principle using stand-alone software. He is willing to help supervising this project. Francesca Dordei is willing to help from the</p>

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	knowledge of the LHCb alignment software side.
Priority	medium
Duration	4 months - desirable to have this done by the beginning of 2017 data taking
Pre-knowledge needed	Basic knowledge of LHCb software and some experience in physics analysis (and being eager to learn something new)

-- LuciaGrillo - 2017-01-25

This topic: LHCb > TandATasks2017

Topic revision: r8 - 2017-02-01 - LuciaGrillo



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