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28/02/2019

Exploring Algorithmic Solutions in Software and Firmware for the CMS L1 Trigger In Preparation for HL-LHC

David Monk

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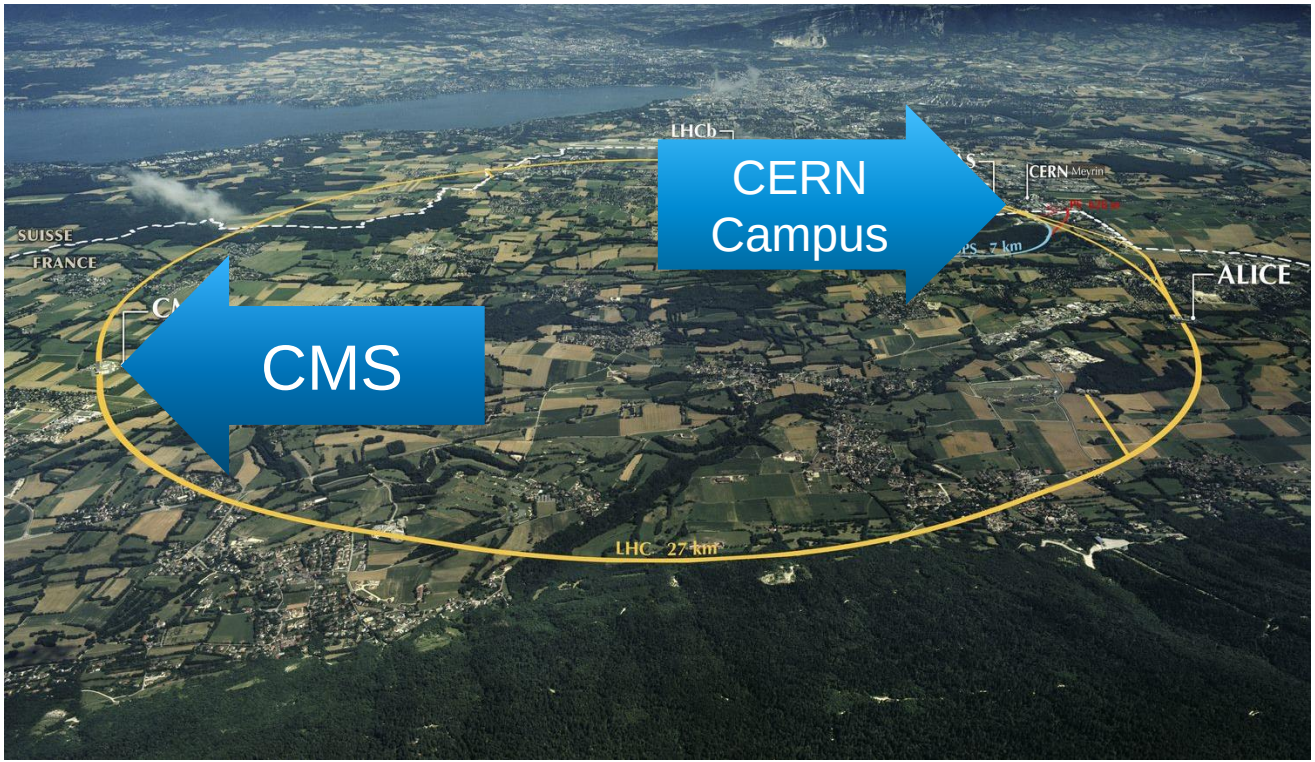
28/02/2019

The Large Hadron Collider (LHC)



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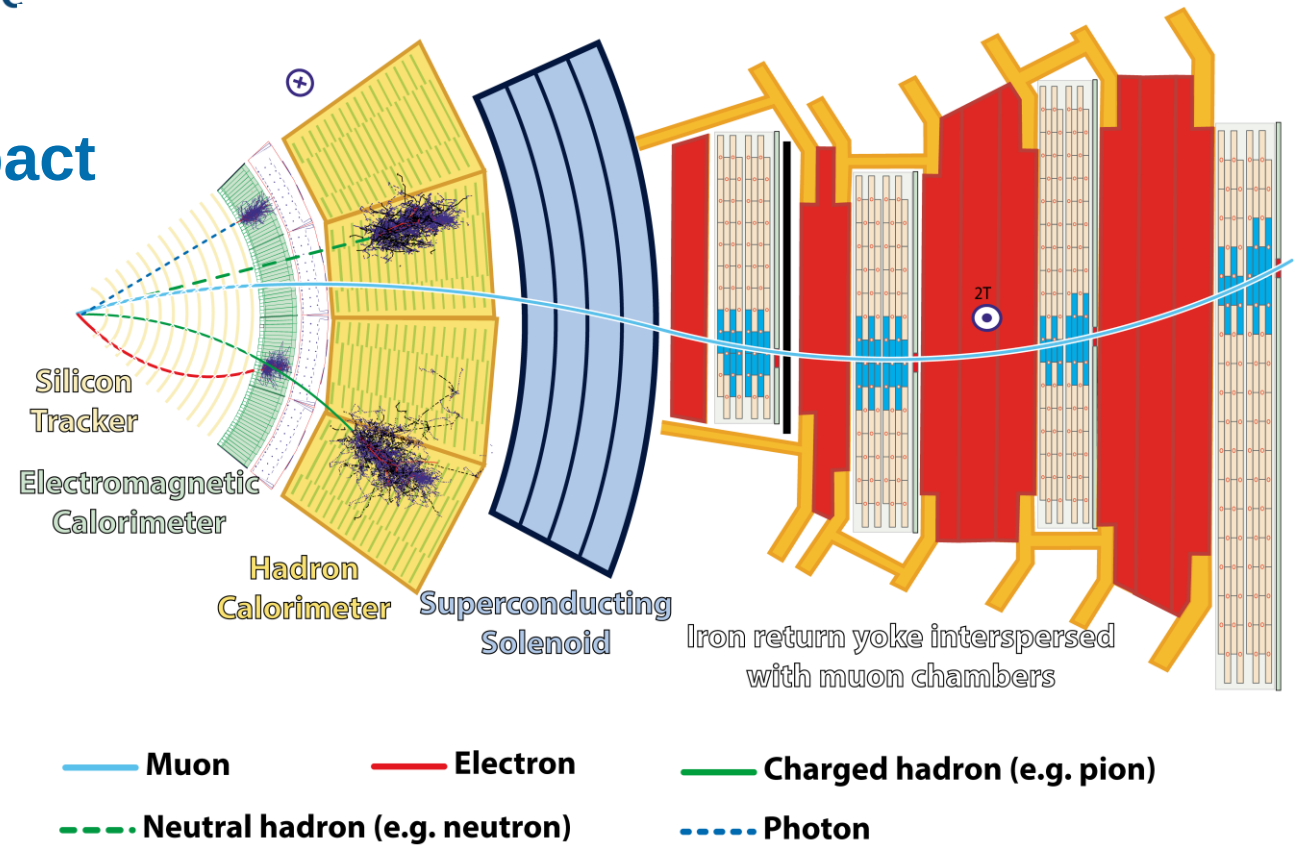
The Compact Muon Solenoid Detector



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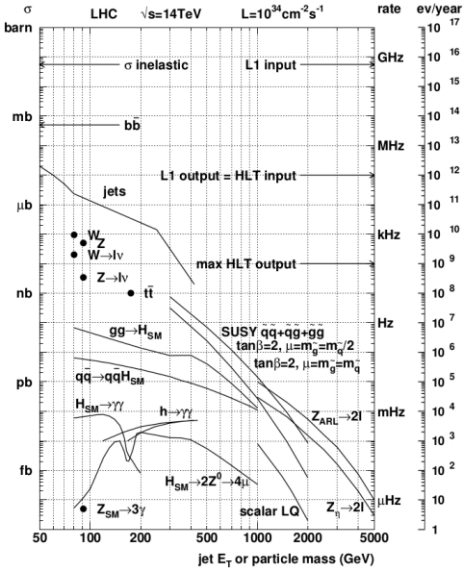
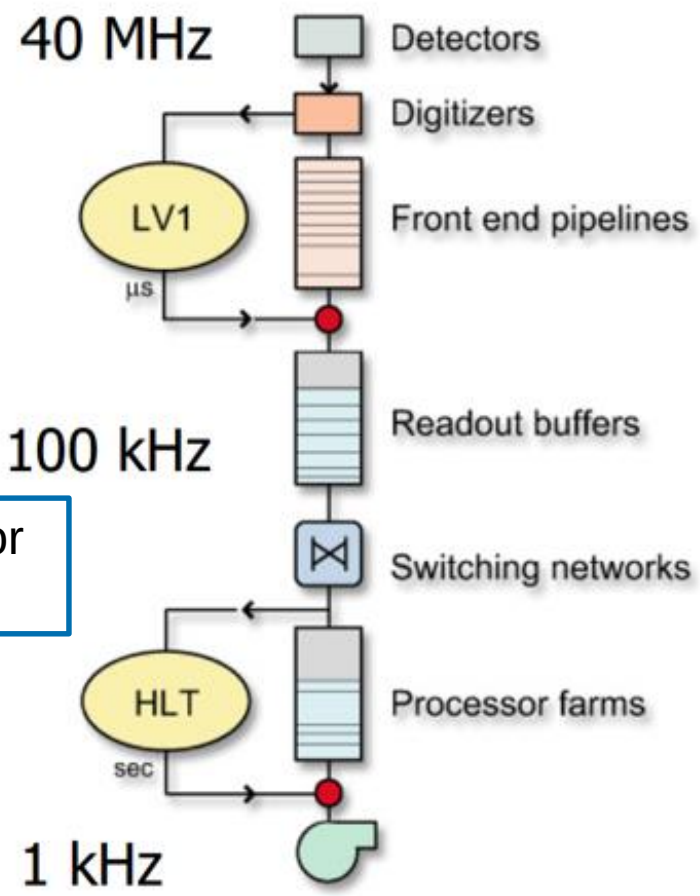
The CMS Trigger System



~500kHz for Phase-II



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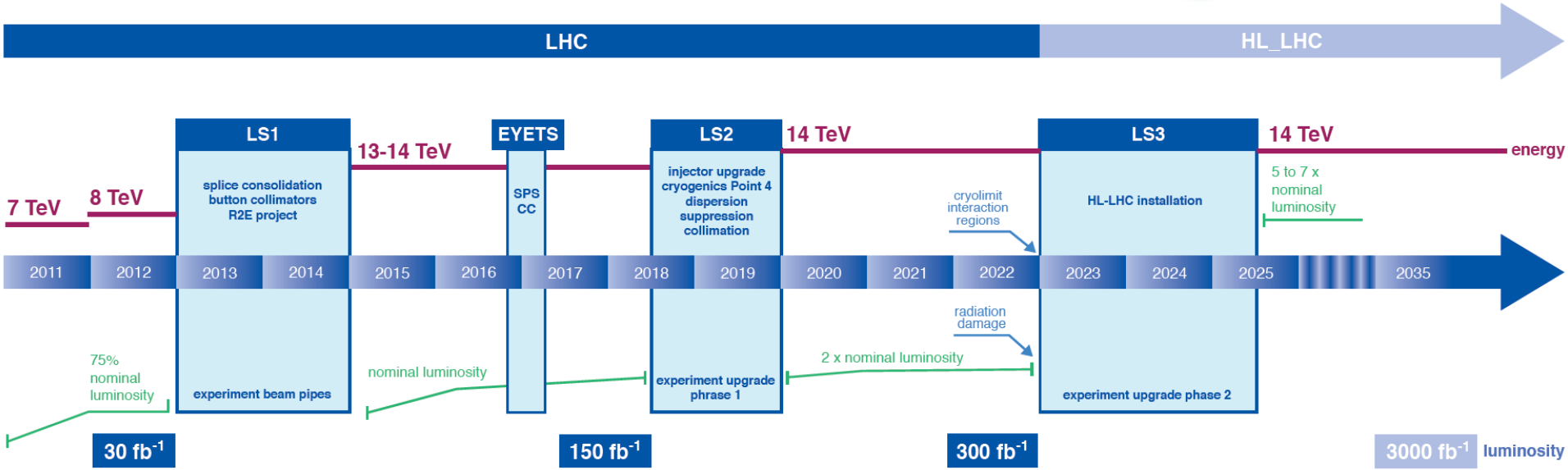
LHC / HL-LHC Plan

High Luminosity LHC



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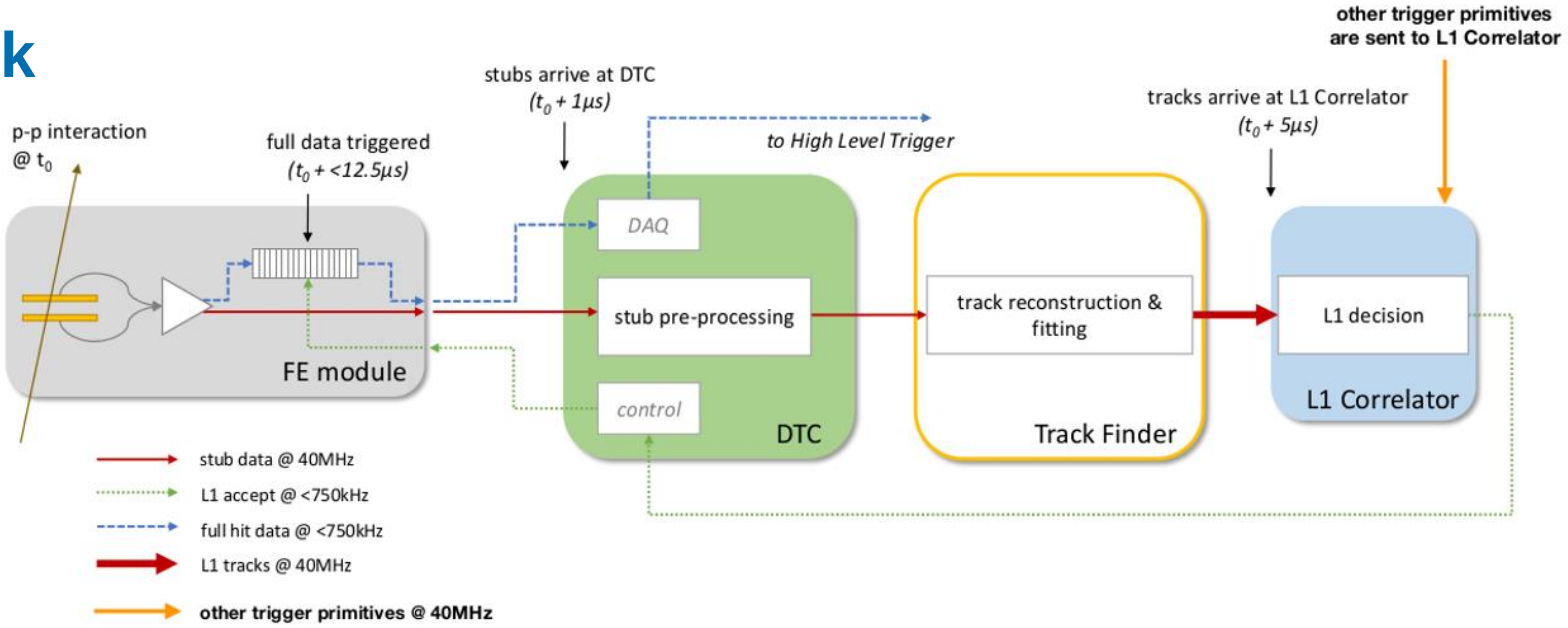
The Track Trigger



Proposed Algorithms

HT+KF
(Imperial College)

- Hough Transform provides seeds for the track fitting
- Kalman filter fits tracks through an iterative process

Tracklet
(USA)

- Seeded by projecting stubs from first two layers
- Fitting by a χ^2 method

Hybrid
(Imperial & CERN)

- Uses Tracklet seeding process
- Followed by a Kalman Filter

Combinatorial Kalman Filter
(David Monk?)

- Move the Kalman Filter to as early a stage as possible in the process
- Potential to greatly improve performance

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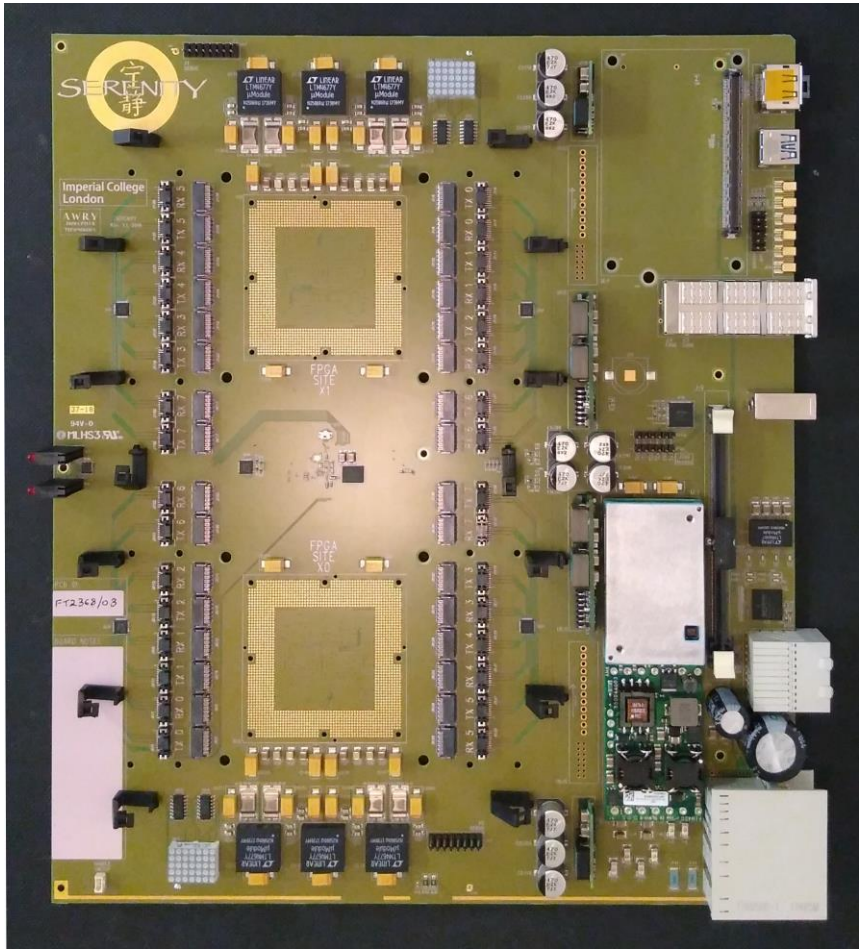
Serenity Hardware Demonstrator



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Thank you for listening!