Flavour Physics at the High Luminosity LHC: LHCb Upgrade II

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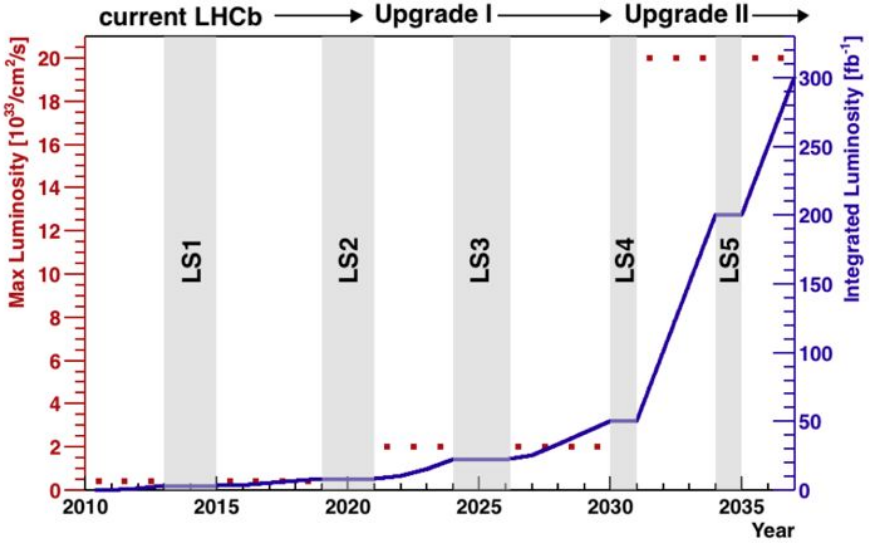
on behalf of the LHCb collaboration

Motivation

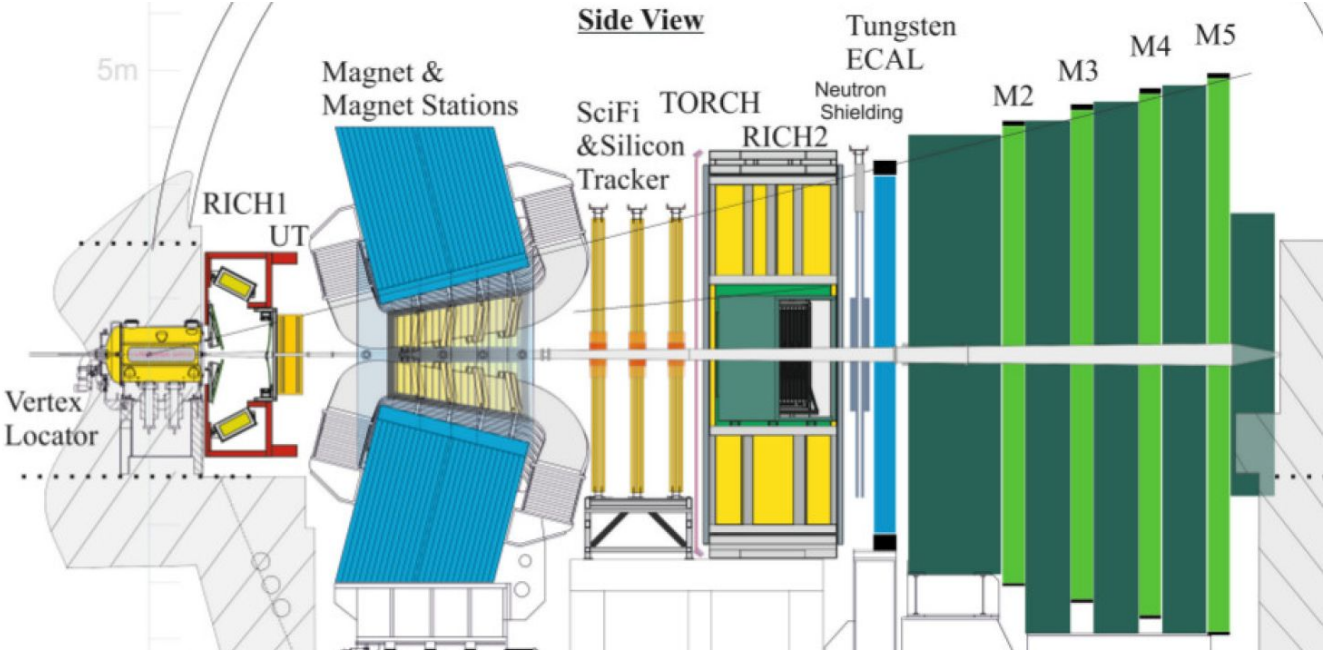


Broad spectrum of flavour-physics measurements:

- Semileptonic $b \to s\, l^+l^-$ and $b \to d\, l^+l^-$ transitions;
- CPV phases γ and φ_s with a precision of 0.4° and 3 μrad;
- CP-violation studies in charm with 10^{-5} precision;
- $B(B^0 \to \mu^+\mu^-)/B(B^0_s \to \mu^+\mu^-)$ with a 20% uncertainty;
- Lepton-universality tests in $b \to c\, l^-\bar{\nu}$ decays;

Overview

Same detector geometry, new sub-detectors and technology updates



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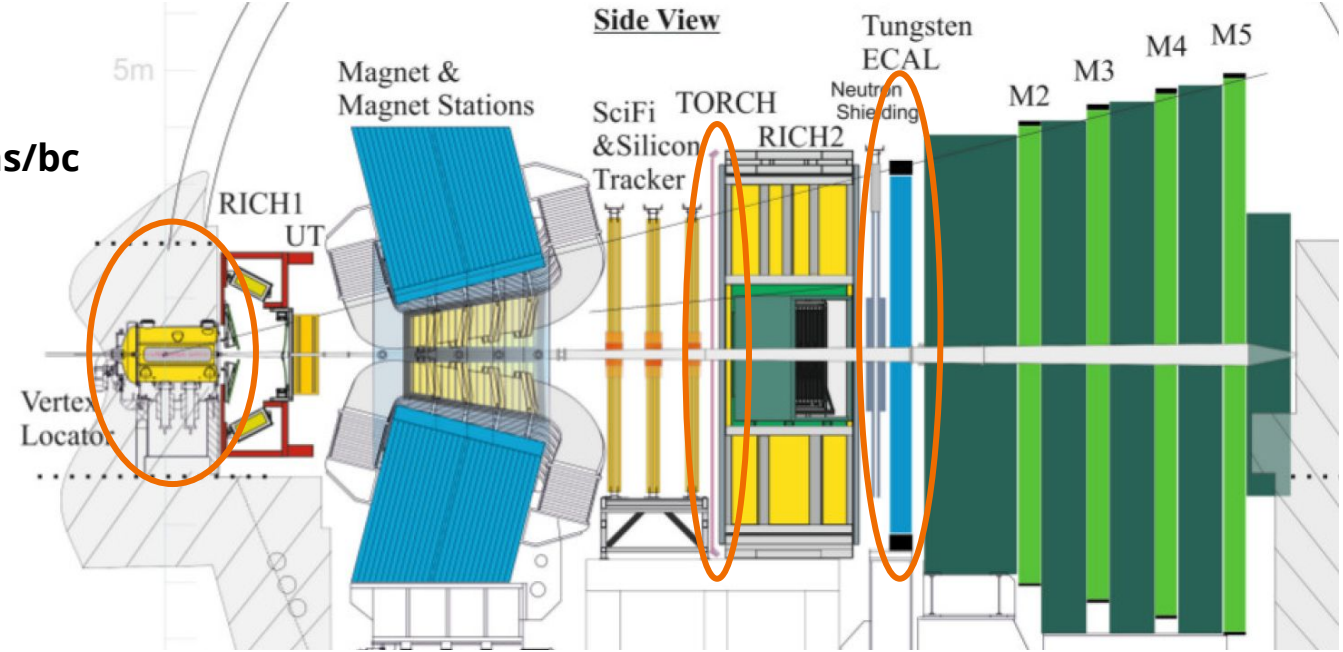
Timing:
~50 collisions/bc



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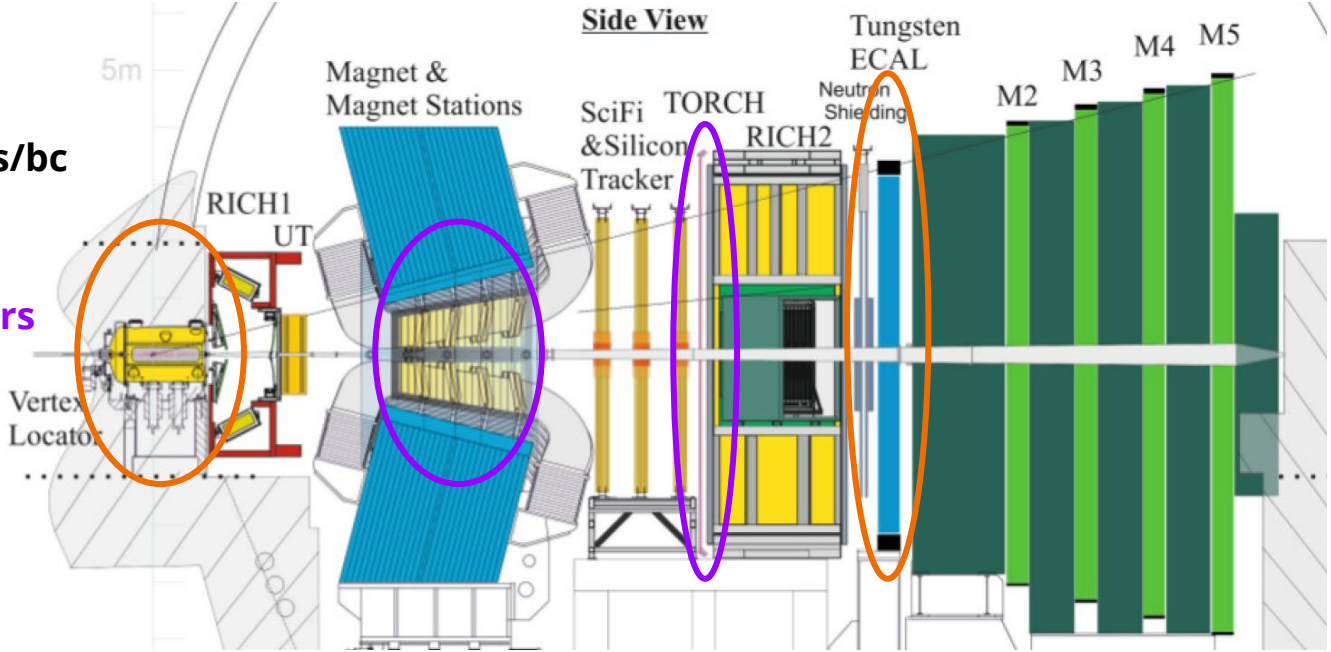
New detectors



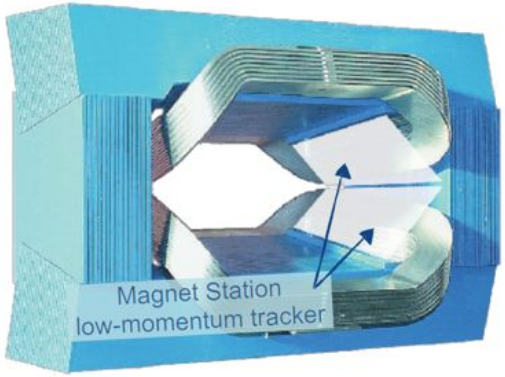
New detectors

Magnet stations

Measurement of low momentum particles:

- strange and charm physics, $\gamma \rightarrow e^+e^-$
- multi-body b decays, near-threshold

Scintillating fibers + SiPMs technology developed for Upgrade I

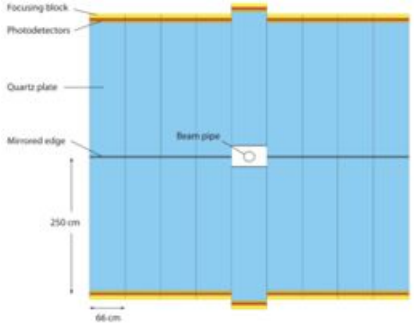


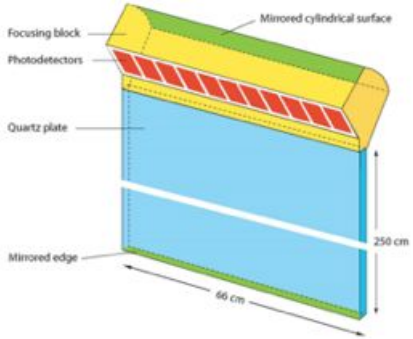
TORCH

Time-of-flight system in downstream region:

- reduce ghost rate, improve Λ^0 efficiency
- provide PID below 10 GeV (RICH1 limit)

1 cm quartz radiator + Micro-Channel Plate PMTs → ~15 ps/track





More Information:

The LHCb experiment: http://lhcb-public.web.cern.ch/lhcb-public

Expression of Interest for a Phase-II LHCb Upgrade: Opportunities in flavour physics, and beyond, in the HL-LHC era: https://cds.cern.ch/record/2244311

Physics case for an LHCb Upgrade II: https://cds.cern.ch/record/2320509

THANKS