

Progress and Plan of The UP Upgrade

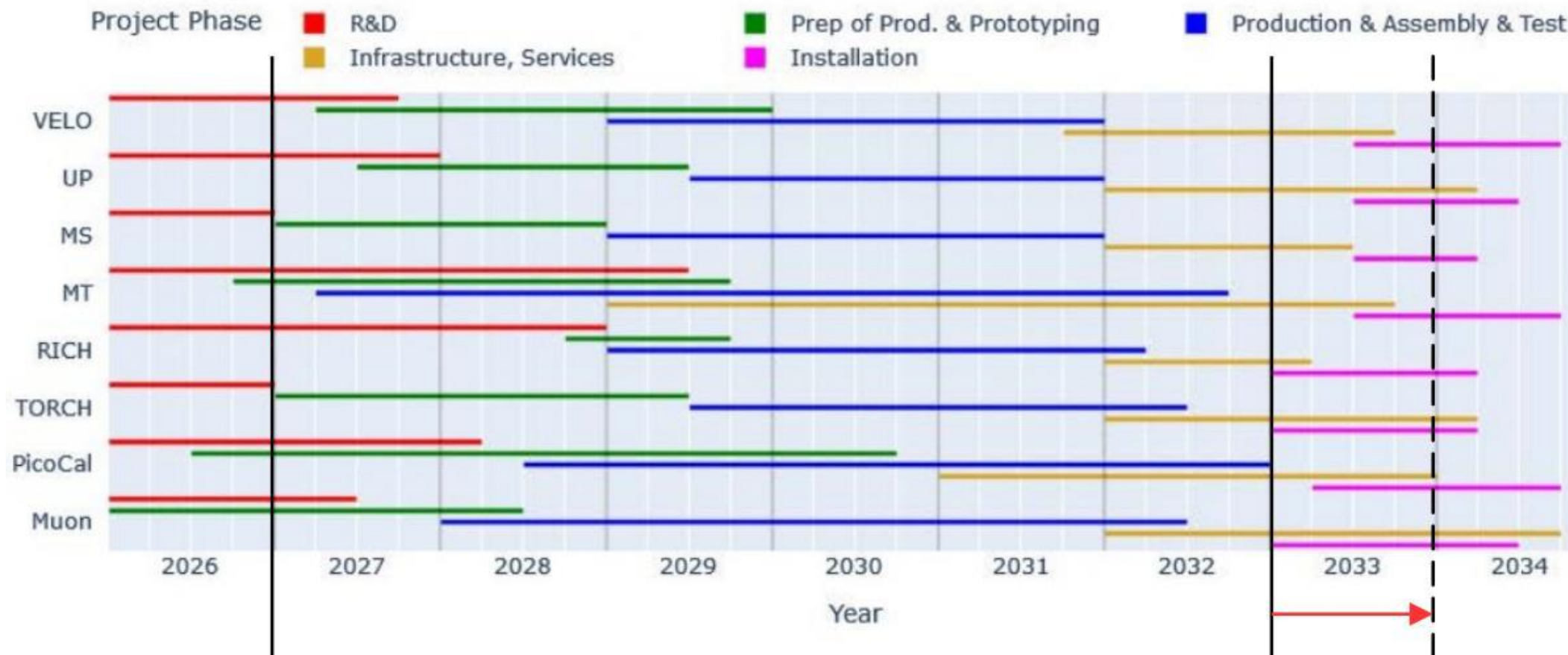
Jianchun Wang

12/18/2024





- ❖ Mighty-Pixel Workshop, Oct 8-10, 2024 @ Heidelberg,
<https://indico.cern.ch/event/1453124/>
- ❖ Mighty-Pixel/UP workshop on Modules, Nov 19-21, 2024 @ Manchester,
<https://indico.cern.ch/event/1464576/>
- ❖ UP mini-workshop, Jan 22, 2025 @ Beijing
- ❖ The 8th Workshop on LHCb Upgrade II, March 26-28 @ Heidelberg,
<https://indico.cern.ch/event/1491351/>



TDR of the LHCb Trackers (UP, MS, MT) is expected to be ready by Q3 of 2026



- ❖ MAPS chips
 - Converge on sensor design scheme
 - Radiation hardness test of different technologies
 - Data compression at the front end or not
- ❖ Module design
 - Grouping size of MAPS chips
 - Mechanical prototype
- ❖ Stave design
 - LV power scheme: serial powering, DC-DC at FE, or DC-DC at SBC
 - Data transmission scheme: Cu/Al traces, or optical fibers
 - Cooling scheme: bi-phase CO₂, liquid cooling
 - Structure of the stave support
- ❖ Readout and control scheme
- ❖ UP box requirements and material budget
- ❖ Geometric configuration
 - Plane coverage
 - Number of planes
 - Module/Stave fiducial coverage
- ❖ Production sites and budget sharing
- ❖ Commonality between UP and MT-CMOS, and shared projects

Find desired topics
and responsibilities



- ❖ The upstream tracker pixel (UP), mighty tracker (MT) and magnet stations (MS) will be included in the Tracker TDR, which is expected to be ready by 2026.Q3.

- ❖ Tentative milestones for UP:
 - 2025.Q1 Requirements of MAPS chip are finalized
 - 2025.Q2 Overall geometric configuration is defined, based on the detector simulation and physics performance studies
 - 2025.Q3 Prototype mechanical modules are produced to validate the design
 - 2025.Q3 Conceptual design of the UP module and the UP stave are finalized
 - 2025.Q4 Common designs and parts between UP and MT-CMOS are decided
 - 2026.Q2 Testbeam studies to demonstrate radiation resilience of the possible MAPS technology, especially for the central area of UP

- ❖ Will be discussed with the U2 management team on Dec 19, 2024