DATA-TAKING PLANS FOR RUN 3

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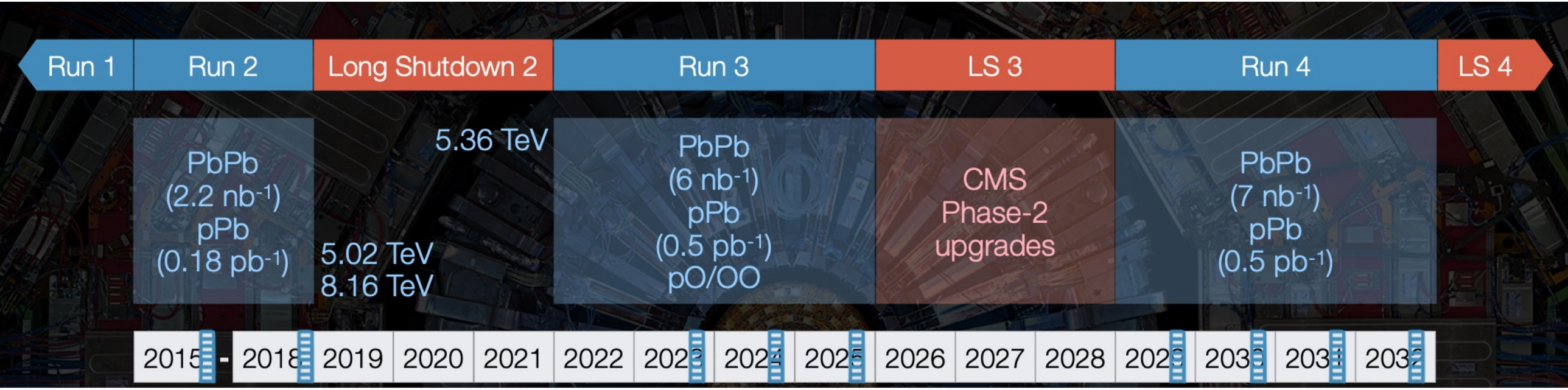
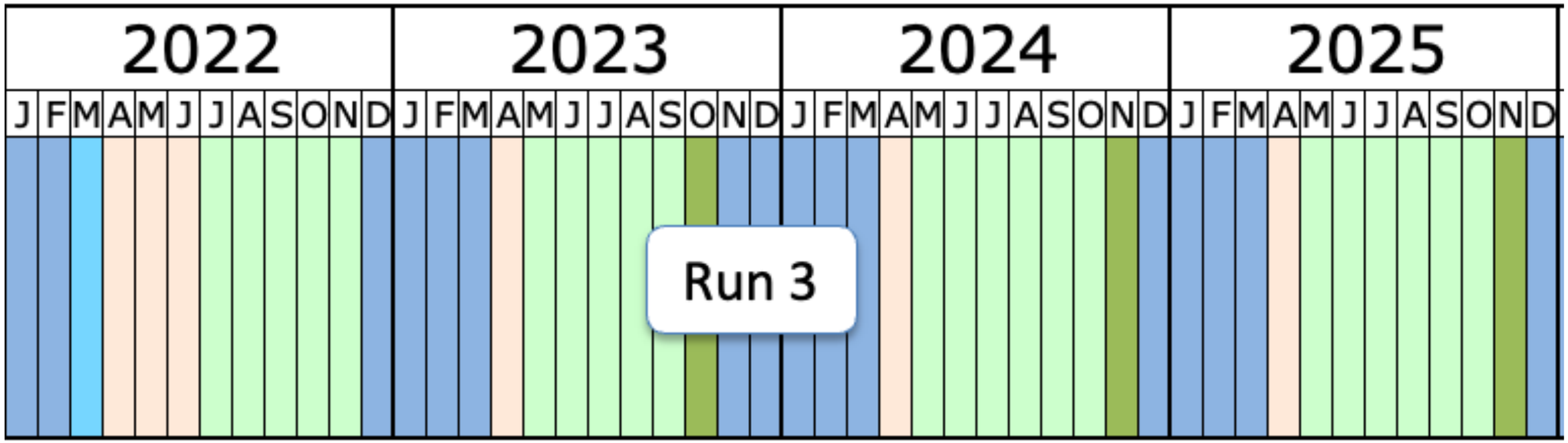
LHC: from Past to Future



We are here!

Run 3 Plans



LHC schedule

2023

5 weeks of PbPb

25 PB RAW

17 PB AOD

2 PB MiniAOD

2024

pp reference

proton-Oxygen

Oxygen-Oxygen

~ 5 PB

2025

5 weeks of PbPb + pp ref

25 PB RAW

17 PB AOD

2 PB MiniAOD

Prompt Reconstruction: from RAW to AOD for 2023 data

- RAW: Detector data after online formatting
- AOD: Reconstructed objects (vertices, tracks, jets, electrons, muons, etc.) and hits

Using cores at CERN

T0 cores: 30000

HLT cores: 32000 (30% to be kept as margin)

Total cores: ~ 50k

Estimated reconstruction time: ~ 2 months

MiniAOD Production: from AOD to MiniAOD for 2023 data

- RAW: Detector data after online formatting
- AOD: Reconstructed objects (vertices, tracks, jets, electrons, muons, etc.) and hits
- MiniAOD: Smaller part of AOD without hits; **The MiniAOD size is 10% of AOD data**

Using CMS cores at ACCRE

Half of all CMS cores at ACCRE will be used for this project

Time needed: ~ 10 days

Summary

- LHC is working hard to achieve its luminosity goals
- The actual run could be different from the plans

2023	2024	2025
5 weeks of PbPb	pp reference	5 weeks of PbPb + pp ref
25 PB RAW	proton-Oxygen	25 PB RAW
17 PB AOD	Oxygen-Oxygen	17 PB AOD
2 PB MiniAOD	~ 5 PB	2 PB MiniAOD

Backup

Run 3 targets

Run 3 luminosity targets

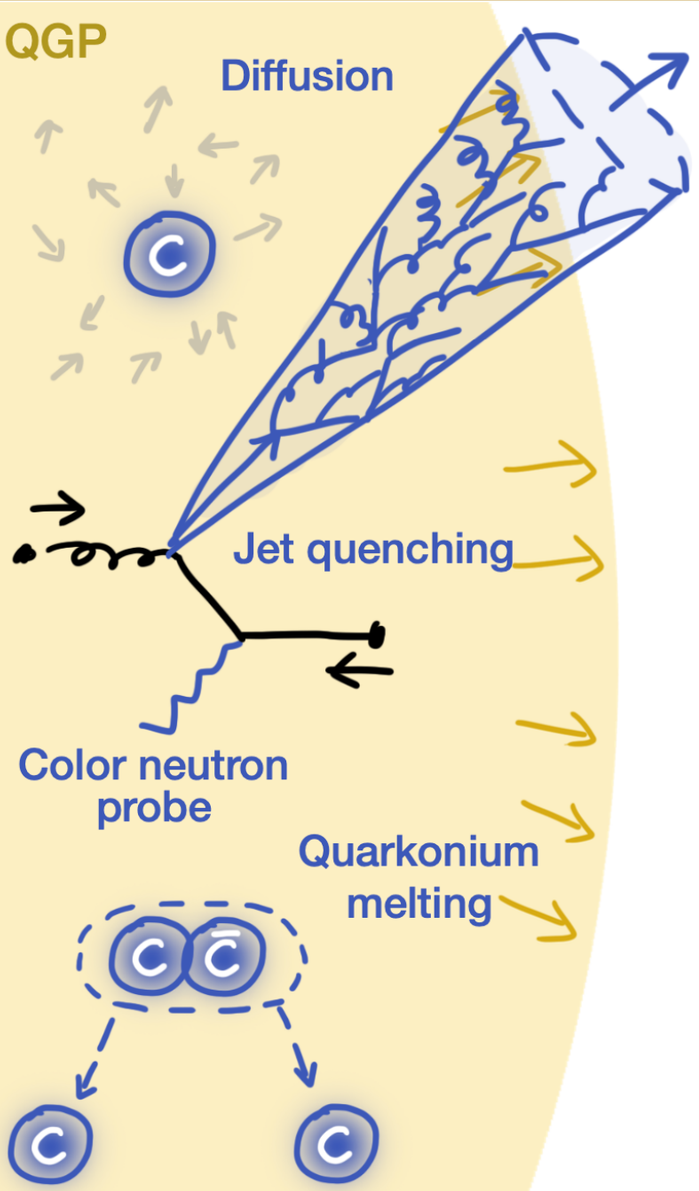
Indicative!

Mode	GPDs	LHCb	ALICE
p-p	250/fb	25 - 30/fb (~50/fb by LS4)	200/pb
Pb-Pb	7/nb (13/nb by LS4)	1/nb (2/nb by LS4)	7/nb (13/nb by LS4)
p-Pb	0.5/pb (~1/pb by LS4)	0.1/pb (~0.2/pb by LS4)	0.25/pb (~0.5/pb by LS4)
O-O	0.5/nb	0.5/nb	0.5/nb
p-O	LHCf 1.5/nb	2/nb	

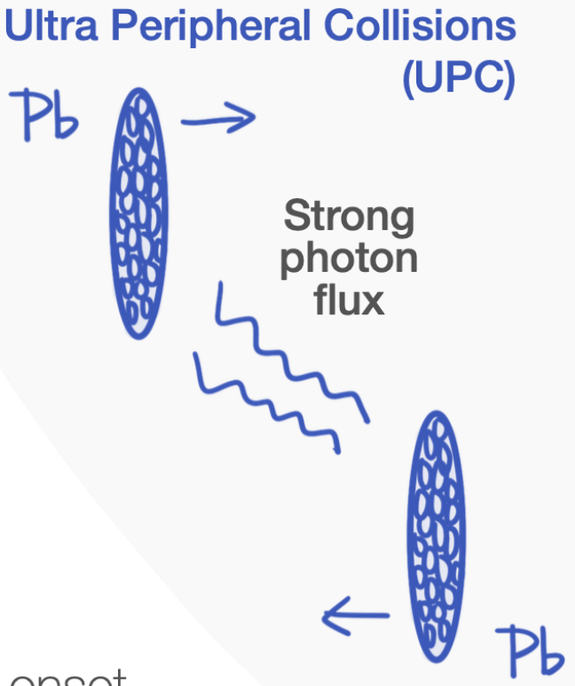
Experiments also require HI reference pp data at 5.x TeV

Updated January 2022 (Run 3: 2022 - 2025)

Physics of Heavy Ions



- "Bulk" observables
  - **Soft particle** spectra
  - **Flow** correlations
  - **Strangeness and hadronization**
- Hard probes of QGP
  - **Jet quenching** energy loss of fast partons
  - **Quarkonia "melting"** color Debye screening
  - **EM probes** control of nuclear effects
  - **Heavy quark diffusion** QGP transport properties
- Small systems (pp/pA) nuclear PDF and search QGP onset
- Non-QGP physics
  - **UPC** SM/BSM studies, gluon structure at small-x
  - **Exotic** hadron structures



Run 3 is crucial for the progress from observable to quantitative property, from phenomena to microscopic structure