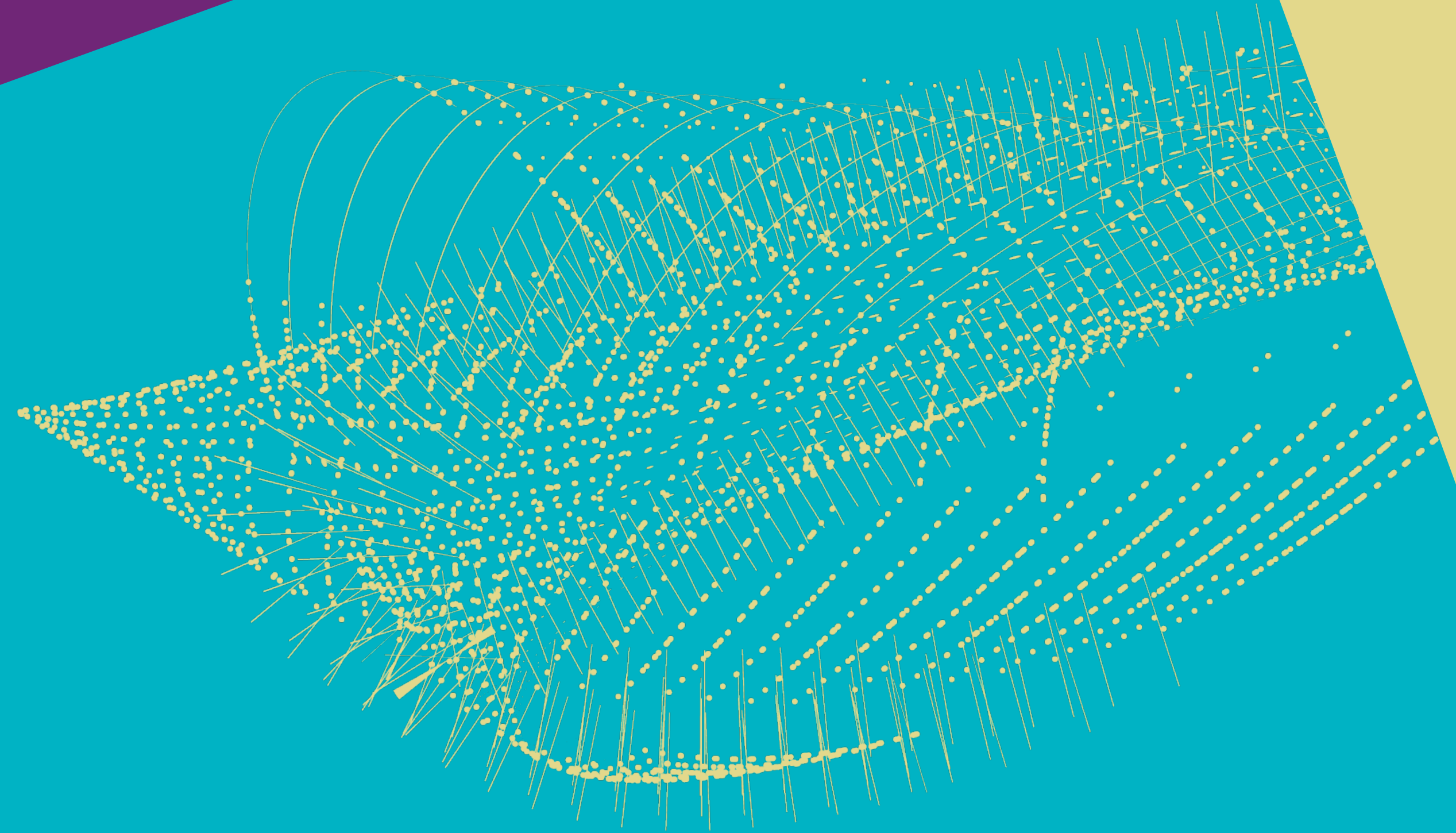




27 AUGUST 2025

# FUTURE COLLIDER SCENARIOS

Nikhef ESPP  
strategy process



# SCENARIOS TO BE DISCUSSED

In his summary slides (see the next slide), Karl Jakobs introduced several scenarios where sequences of future colliders at CERN bring us eventually to high-energy 10 TeV parton scale collisions. Understanding the implementation challenges and the physics potential of these scenarios will help us to reflect on our preferences. The following scenarios will be introduced during our meeting on Sept 16th.

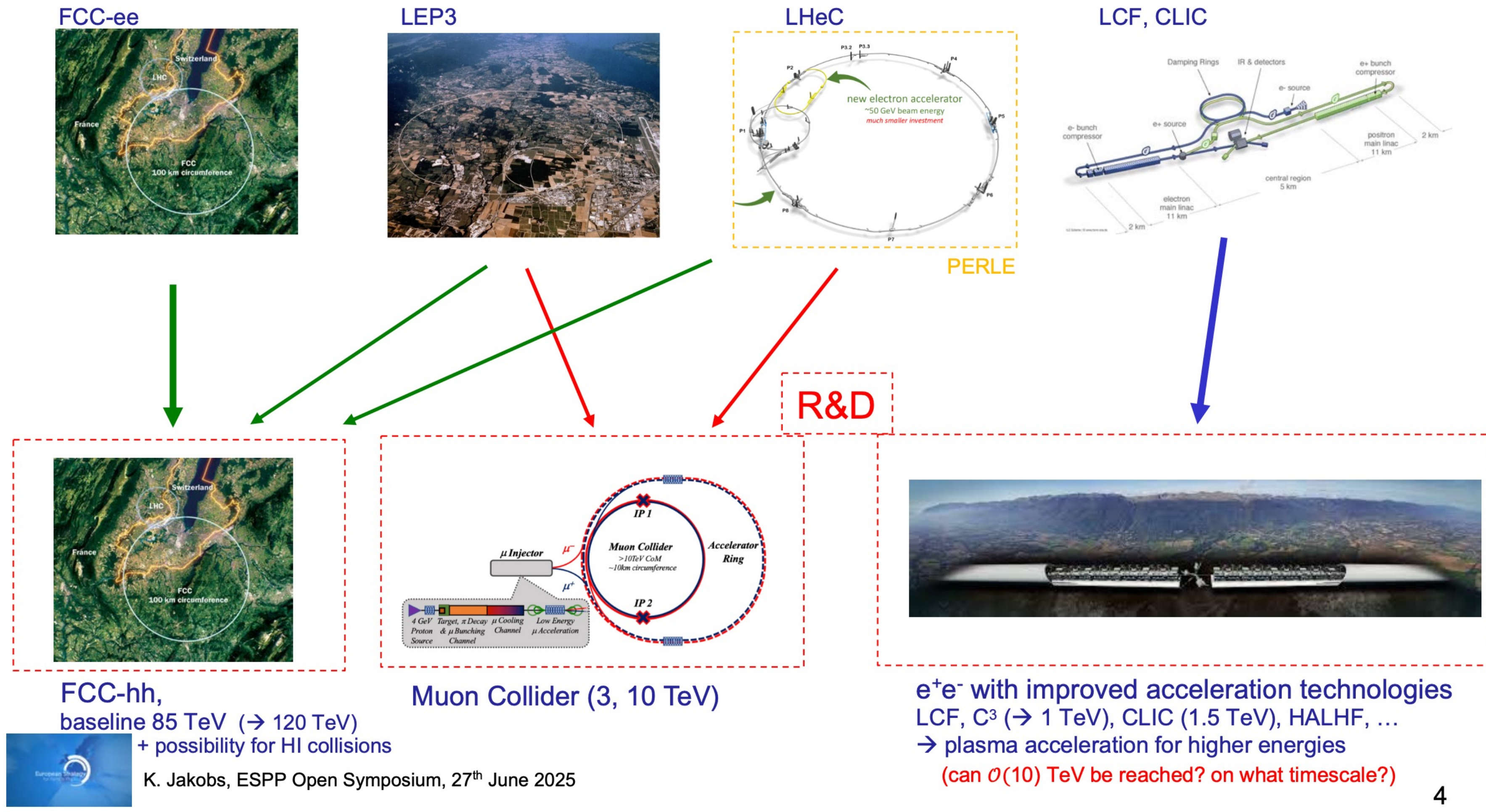
- **FCC-ee → FCC-hh** : the integrated FCC program with a 90km circular tunnel starting with a EW/H/top  $e^+e^-$  factory and moving to a hadron collider reaching  $\sim 100$  TeV proton collisions.
- **LCF/CLIC → higher energy LCF/CLIC** : a linear  $e^+e^-$  collider facility with a  $\sim 30$ km tunnel in several stages from 250-380 GeV to 550 GeV collision energies and to energies around or above 1 TeV, potentially integrating novel accelerator technologies (e.g. plasma-based)
- **LEP3 → FCC-hh** : reusing the LEP/LHC tunnel for an extensive EW/H  $e^+e^-$  program and thereafter moving to a hadron collider reaching  $\sim 100$  TeV proton collisions in a 90k circular tunnel
- **LEP3 → MuCol** : ... or after LEP3 moving to a novel muon collider with up to 10 TeV collisions
- **LHeC → FCC-hh** : continue using the HL-LHC proton/ion beams in addition to a new electron accelerator (50 GeV) reaching  $>1$ TeV ep collisions for a broad physics program and thereafter moving to a hadron collider reaching  $\sim 100$  TeV proton collisions in a 90k circular tunnel
- **LHeC → MuCol** : ... or after LHeC moving to a novel muon collider with up to 10 TeV collisions
- **LHeC → FCC-ee → FCC-hh** : start with the LHeC as a bridge project in the 2040'ies and thereafter move to the integrated FCC program

Get in touch with Jorgen in case other scenarios are to be included in the discussion.



# SCENARIOS TO BE INTRODUCED

*Potential for development: future 10 TeV parton-scale collider options*



K. Jakobs, ESPP Open Symposium, 27<sup>th</sup> June 2025