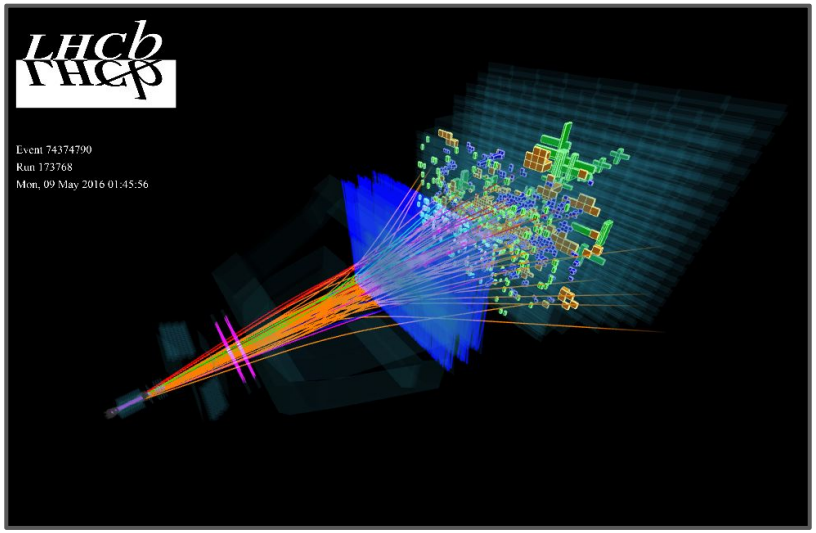


LHCb Ntupling Service Walkthrough

22.10.2024

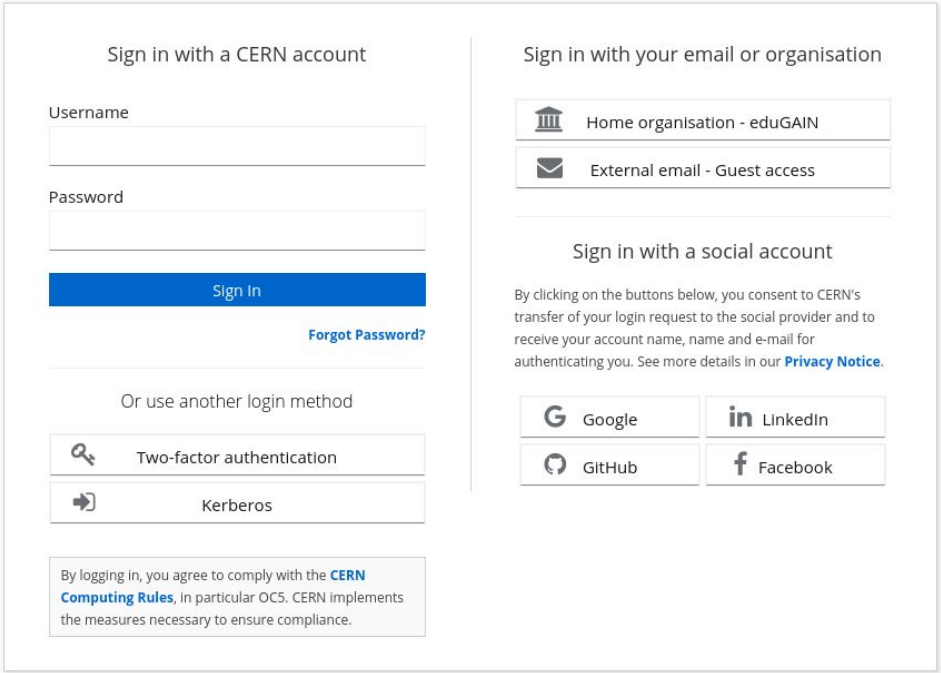
Christine Aidala[1], **Dillon Fitzgerald[1]**, Kai Habermann[2], Ludwig Kramer[2], Adam Morris[3], Sebastian Neubert[2], Piet Nogga[2], Eduardo Rodrigues[3], Marco Donadoni[3], Daan Rosendal[3,4], Tibor Simko[3]

[1]University of Michigan, [2]University of Bonn
[3]CERN ,[4]Windesheim University

Access to beta release

The link to the beta release was emailed to registered users!

You will first see this landing page…



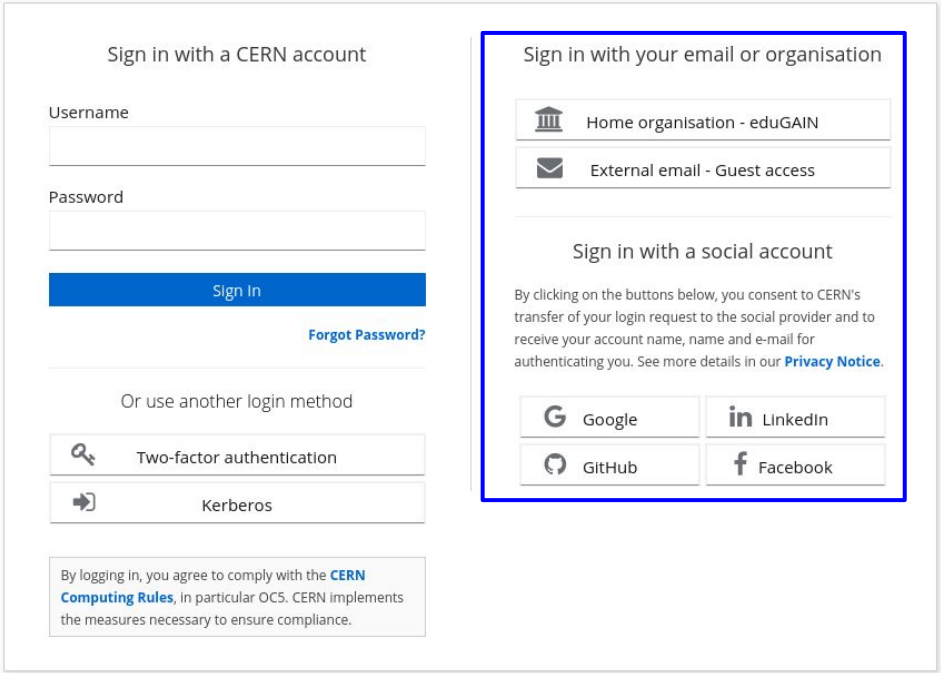
Access to beta release

The link to the beta release was emailed to registered users!

You will first see this landing page…

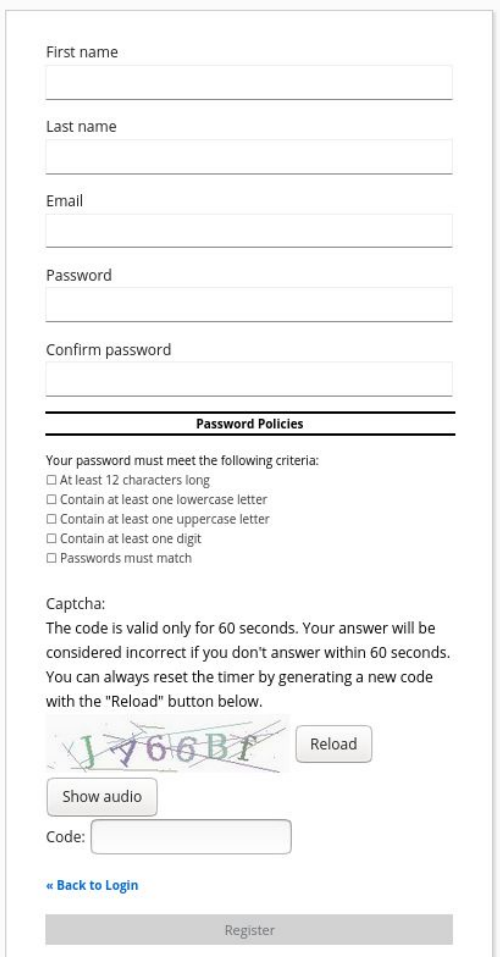
Login with external emails and social accounts are permitted!

- If possible, please register and login using the same email address used to register for the Implications Workshop and this event. Otherwise, please let us know so we can take note of your preferred email address.



Register External Email Address

Using the same email you registered for the event with will allow us to verify your identity when reviewing your requests

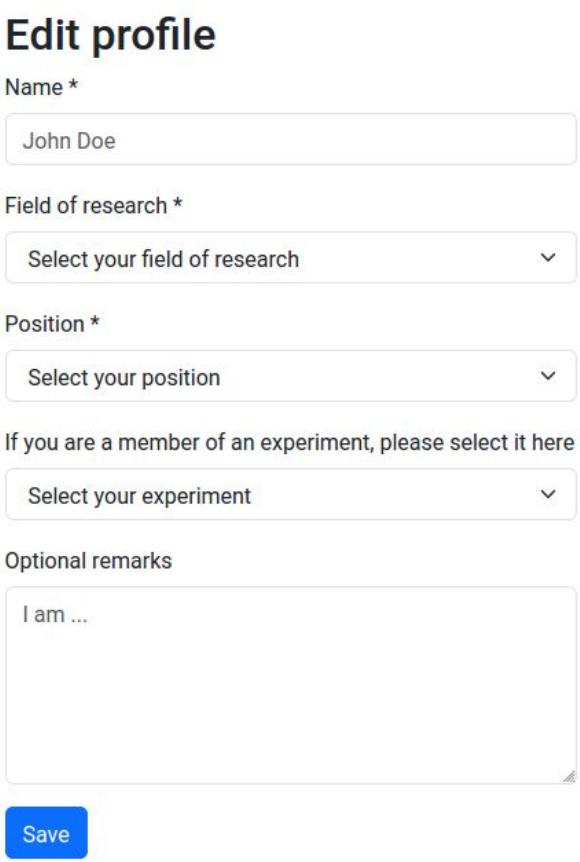


Creating your Profile

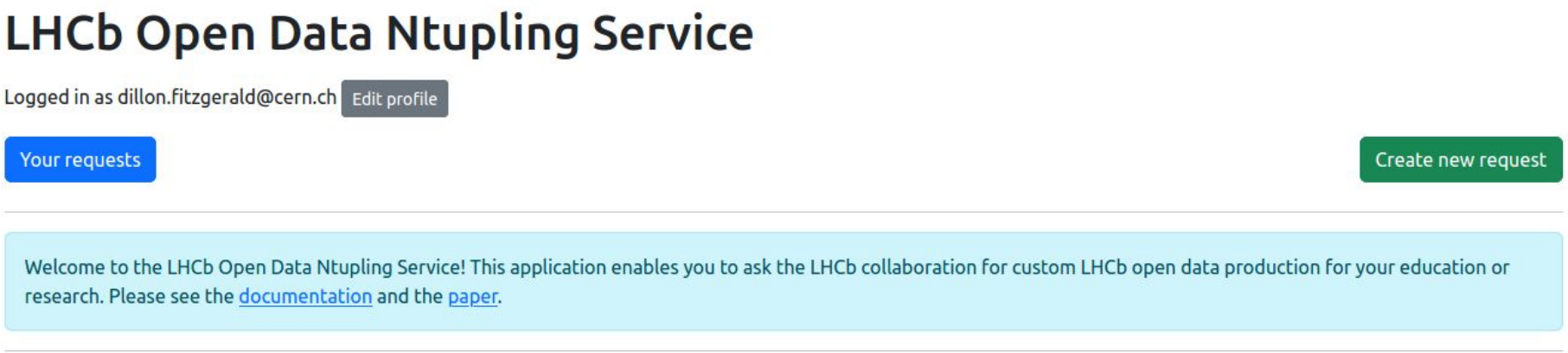
Once the authentication step is complete, you will be prompted to create a profile on the LHCb Ntupling Service

This information is useful to us for:

- Improving the LHCb Ntupling Service based on the needs of the active user base
- Collecting statistics to communicate with funding agencies



Now you are ready!



Live Demo and Interactive Walkthrough

I will show you how to make a request to produce Ntuples for the following decay

$B_s^0 \rightarrow (J/\psi(1S) \rightarrow \mu^+\mu^-)(\phi(1020) \rightarrow K^+K^-)$

This channel has been used at LHCb to quantify CP violation!

- Phys. Rev. Lett. 132, 051802 (2024)
- Phys. Rev. Lett. 114, 041801 (2015)
- Eur. Phys. J. C 79, 706 (2019); erratum 80, 601 (2020)

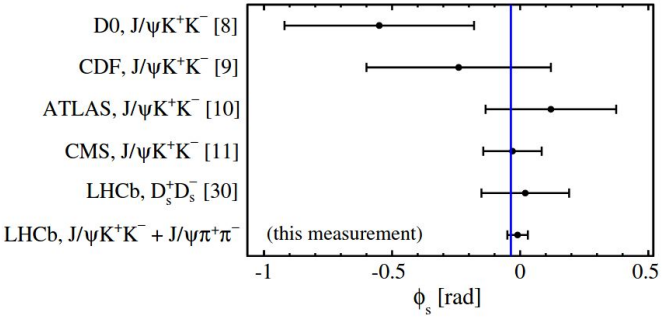
Physics Motivation

- B_s^0 oscillates between different eigenstates
- The final state is a mix of CP-even and CP-odd eigenstates depending on the relative orbital angular momentum of the J/ψ(1S) and ϕ(1020) mesons
- The CP violating phase ϕ_s arises from interference of decay amplitudes from decays occurring before and after B_S^0 oscillation between eigenstates
    - It can be extracted by disentangling the mixture of CP-even and CP-odd states of the decay products

Reference: Phys. Rev. Lett. 114, 041801 (2015), Phys. Rev. Lett. 132, 051802 (2024)

CP Violation at LHCb

So important to LHCb's core science mission that it is in our logo!



[Phys. Rev. Lett. 114, 041801 (2015)]

[Nat. Phys. 18, 1–5 (2022)]