Detecting Z' → ttbar resonances at the FCC-hh

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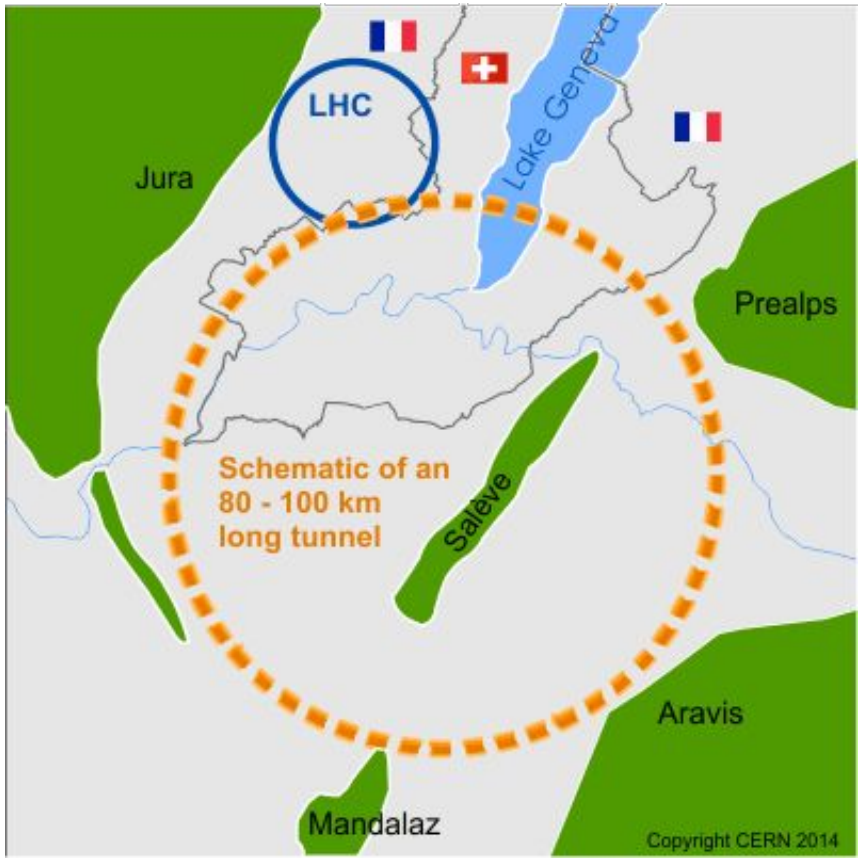
FCC-hh is a proposed post-LHC particle accelerator

100 km long (LHC is 27 km)

Up to $\sqrt{s}$ = 100 TeV

Would look for new physics at masses higher than LHC can currently achieve

Conceptual design report by 2018…



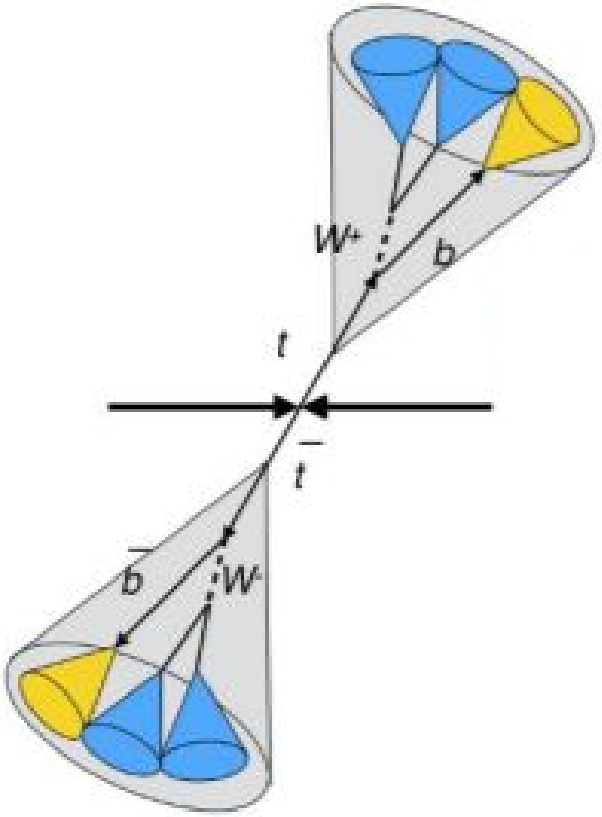
https://fcc.web.cern.ch/Pages/Media.aspx

Z' → ttbar resonance

SM extensions predict gauge interaction with heavy top quark, production of new massive Z-like boson

Currently excluded at masses < 2-4 TeV/c^2 (depending on model)

Z' → ttbar signal



CMS-PAS-B2G-15-002/3

Discovery potential and detector performance

Four detector configurations:

- 3 FCC --- good, average, bad
- 1 CMS --- for comparison

Look at feasibility of discovery based on detector configurations and different Z' masses

- Higher Z' masses decay to highly collimated top jets
- Detector resolution affects ability to accurately reconstruct top jet mass → Z' mass

Workflow

Produce signal samples and background (SM ttbar and QCD non-top multijet) using MadGraph5/Pythia8

Produce flat ROOT files with Heppy (python framework for HEP data analysis)

Run analysis over possible Z' masses

Compare results for each detector configuration