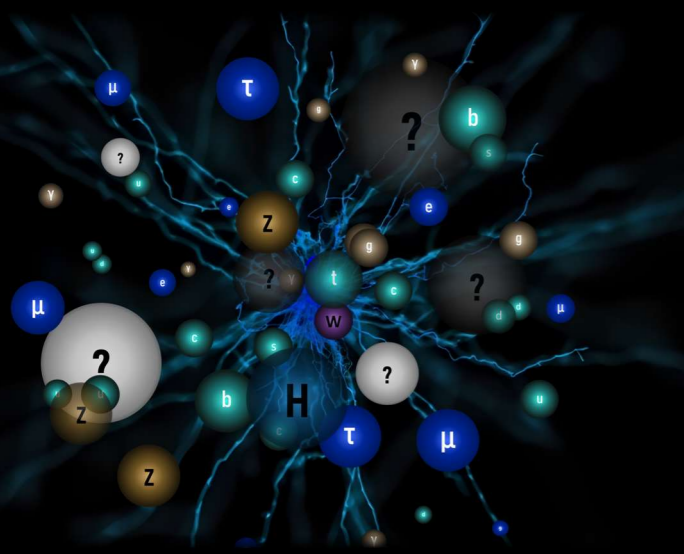


BACK TO THE BIG BANG FUTURE

B. KILMINSTER GROUP

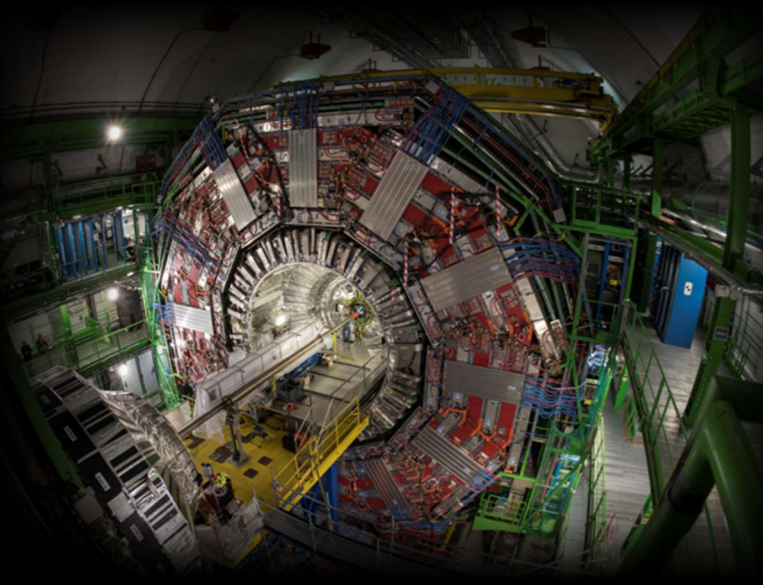
$T = 10^{-11}$ SEC

Just after the Big Bang, the universe was full of exotic particles that don't exist today. With Colliders, we can go back in time to reproduce these moments and study the interactions.



$T = \text{TODAY}$

Today we study these collisions with the CMS experiment at the CERN LHC. We are interested especially in searching for new particles, new forces, new Higgs bosons, and understanding the matter antimatter asymmetry in the universe.



$T = \text{THE 2040s}$

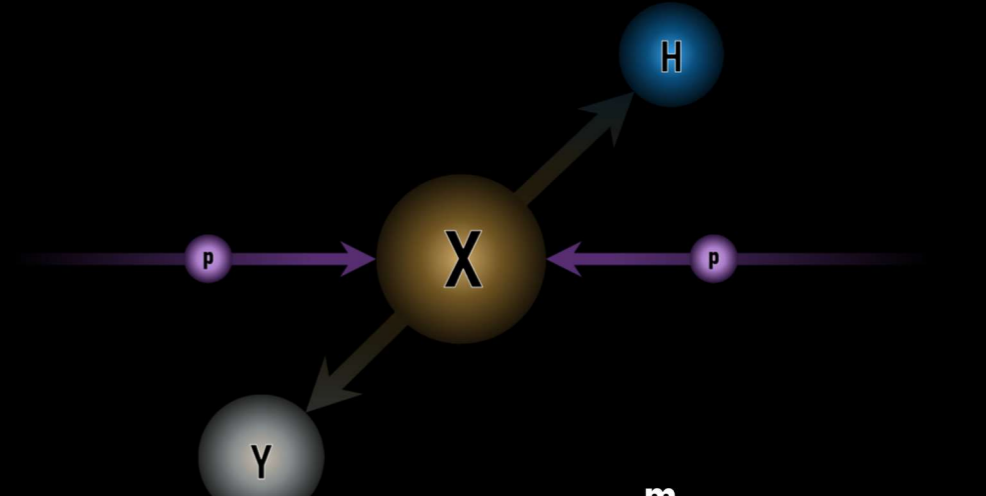
We are currently planning the next future collider at CERN, the FCC-ee, which will study interactions precisely and hopefully break the Standard Model



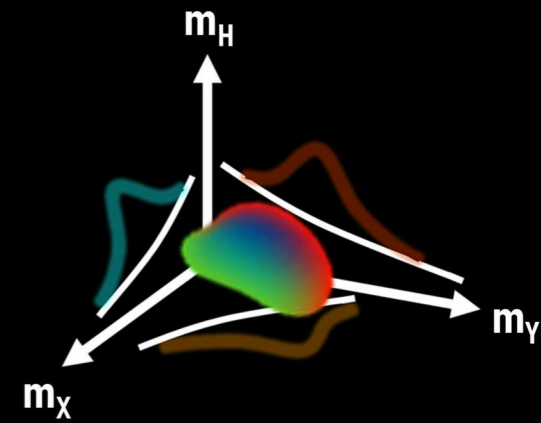
Searches for New Heavy Bosons

Are there new heavy particles and forces that interact with the Higgs boson?

The LHC can potentially create those new particles. The SM Higgs can interact with them in a special way, leading to unique detector signatures



Each heavy particles can form resonance, requiring 3-D mass fit



Precision CP Violation Measurements

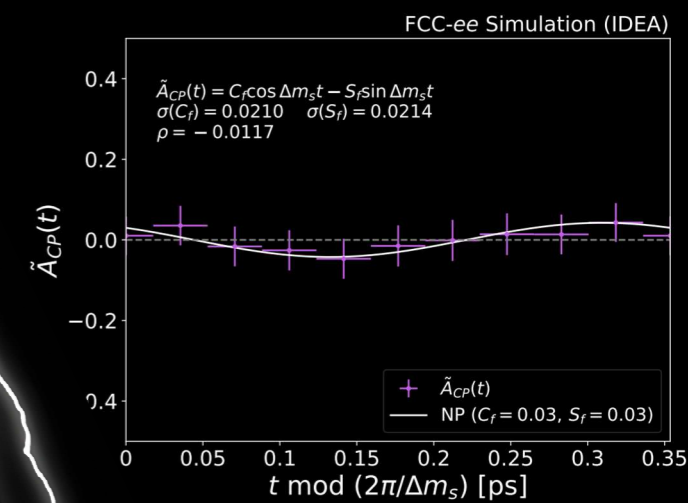
Why is there more matter than anti-matter?

Neutral mesons can oscillate into their anti-mesons due to CP (charge-parity) Violation



We measure different processes in colliders, extracting New Physics contributions

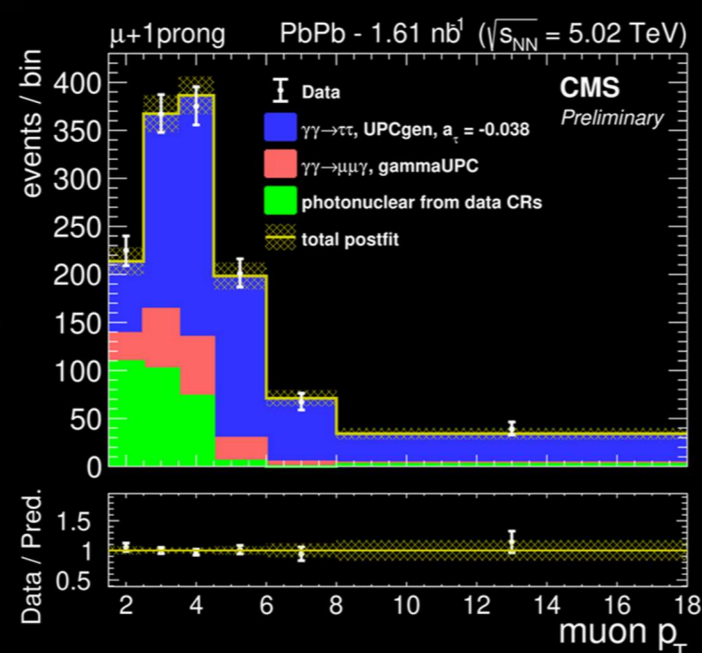
At FCC-ee, CP Violation can be measured with higher precision and as a function of time



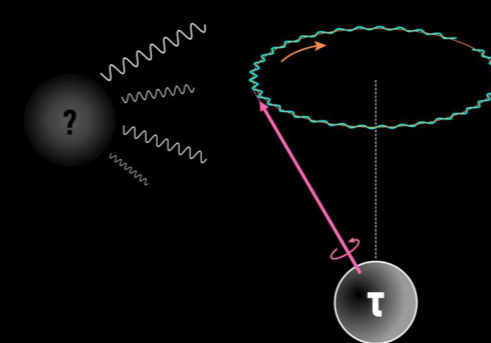
Precision Measurement of $(g_{\tau}-2)$

What new forces are in the vacuum?

To answer this, we study the magnetic moment of the τ lepton, produced by photons at the LHC. We can study the shape of the τ momentum distribution to search for new physics in the vacuum



Potential new forces can affect τ 's precession



LET'S TIME TRAVEL BACK TO THE BIG BANG. CURIOSITY IS YOUR TICKET.

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