

Virtual Reality for Science at UCLA

Workshop at UCLA

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I) Overview of VR and mature UCLA applications

Virtual Reality for Science at UCLA

- Virtual Reality (VR) applications in science allow for **a more instinctive and immersive understanding** of scientific phenomena
- VR devices such as the Oculus Quest Series and Apple Vision Pro are scaling → **potential for scientific applications!**
- The UCLA Physics VR lab has produced a range of applications
 - See <https://vr.physics.ucla.edu>
- Most of the work has been and will continue to be done by UCLA undergraduates

The VR Toolkit

- We've been developing VR apps (APKs) in Unity – a game development platform with VR features.
- To use any APK, the user must have an Oculus headset (Quest 2+) and controllers.



Oculus Quest 3



Oculus Quest 2

Demo sessions:

- There are seven demos: VR Fields, Hypercubes, CMS VR, VR Spy, G4 VR, G4 VR-dark matter, and ROOT VR)
- There are three demo sessions: morning, noon, and afternoon
- We will schedule 5-minute demo time slots for each attendee
- Please sign up for one time slot for each of the seven demos

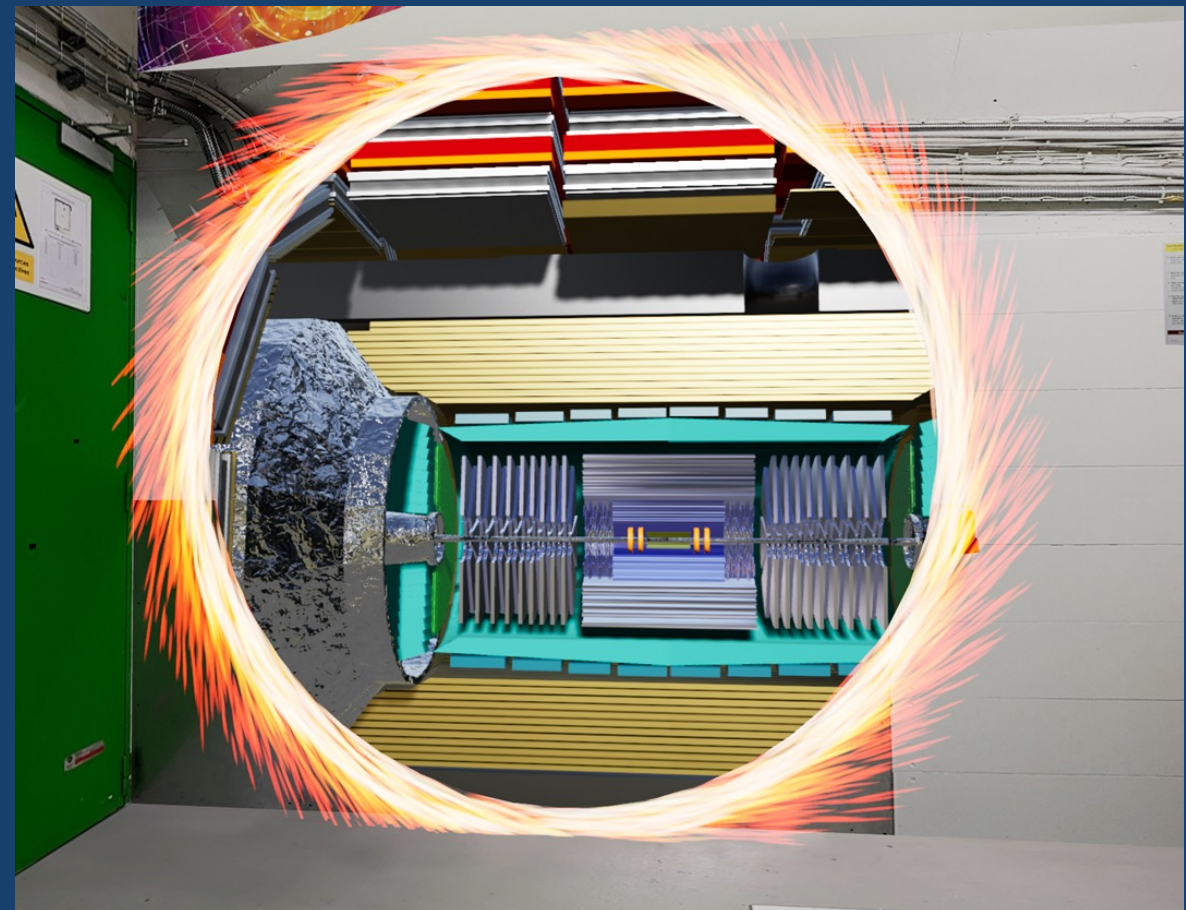
Today's first session before the demo break:

Well-developed applications:

1. Exploring the CMS Detector and LHC Data with **CMS VR** and **VR Spy** (Andrew Su)
2. Electric fields in full VR with **VR Fields**, and **Hypercubes** (Nathan Joshua)
3. Visualizing 4, 5, 6... dimensional data in Virtual Reality with **Data VR** (Benjamin Jobilal)

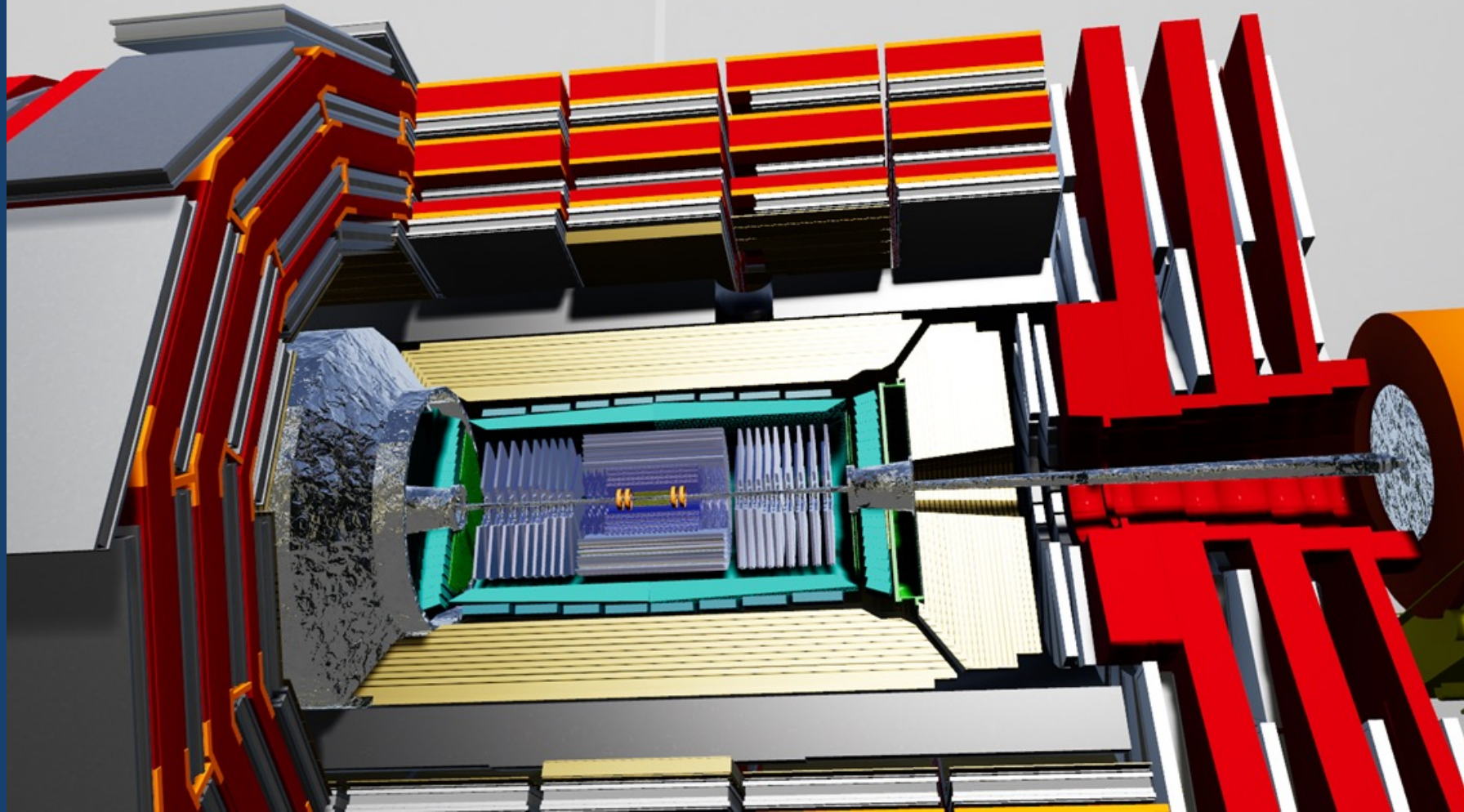
Our VR projects began with LHC particle physics

- View the complex particle detector with **CMS VR**

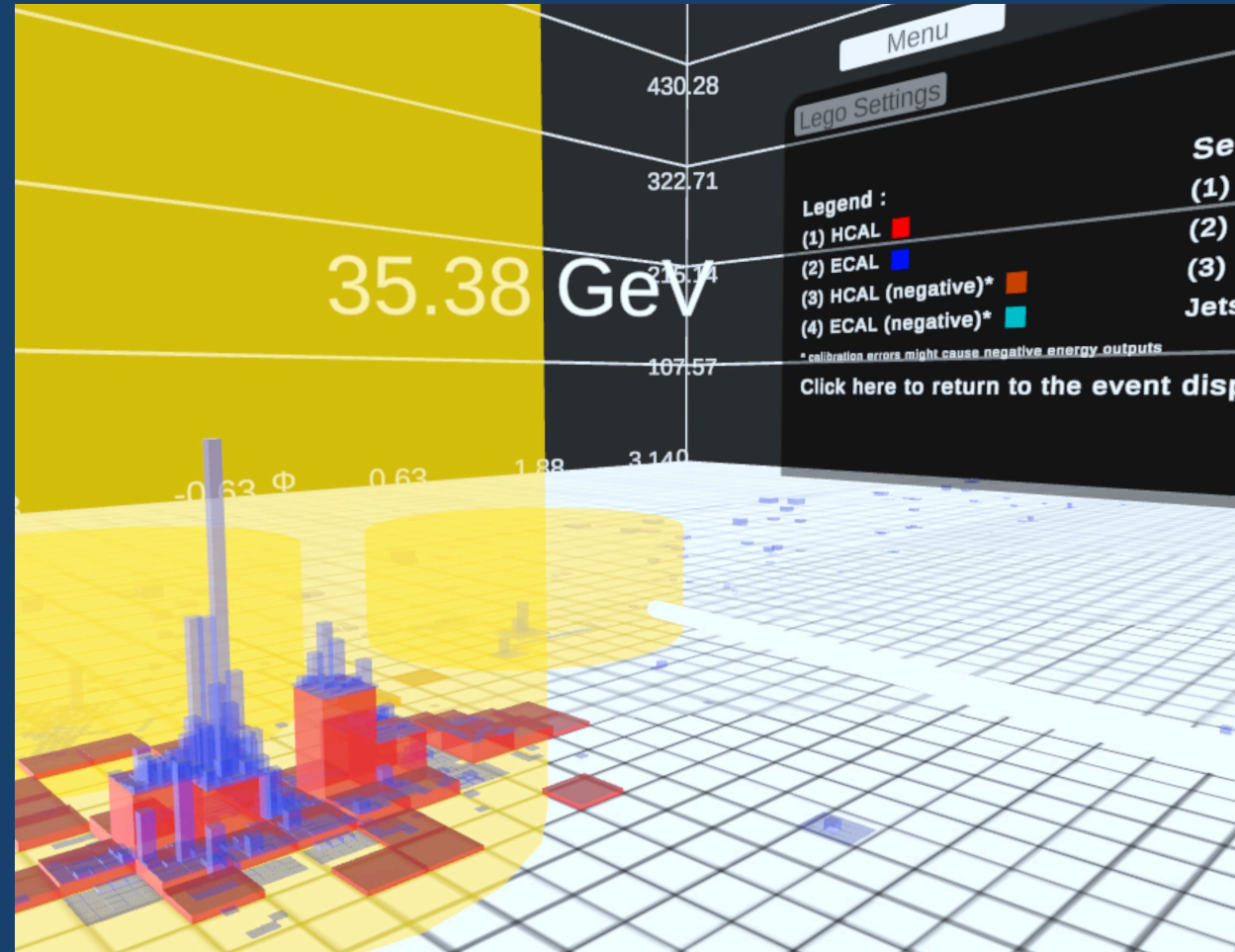
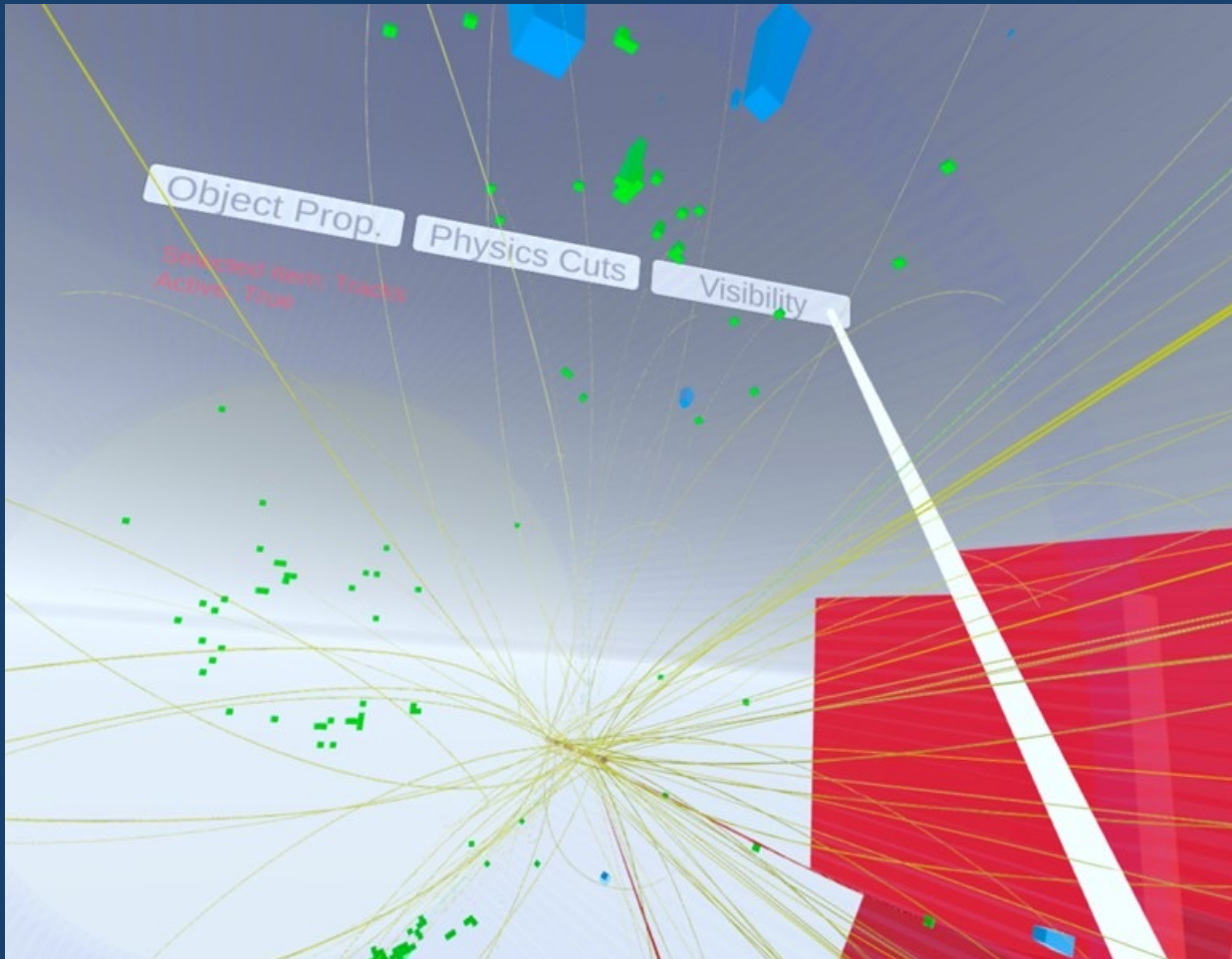


CMS VR by UCLA

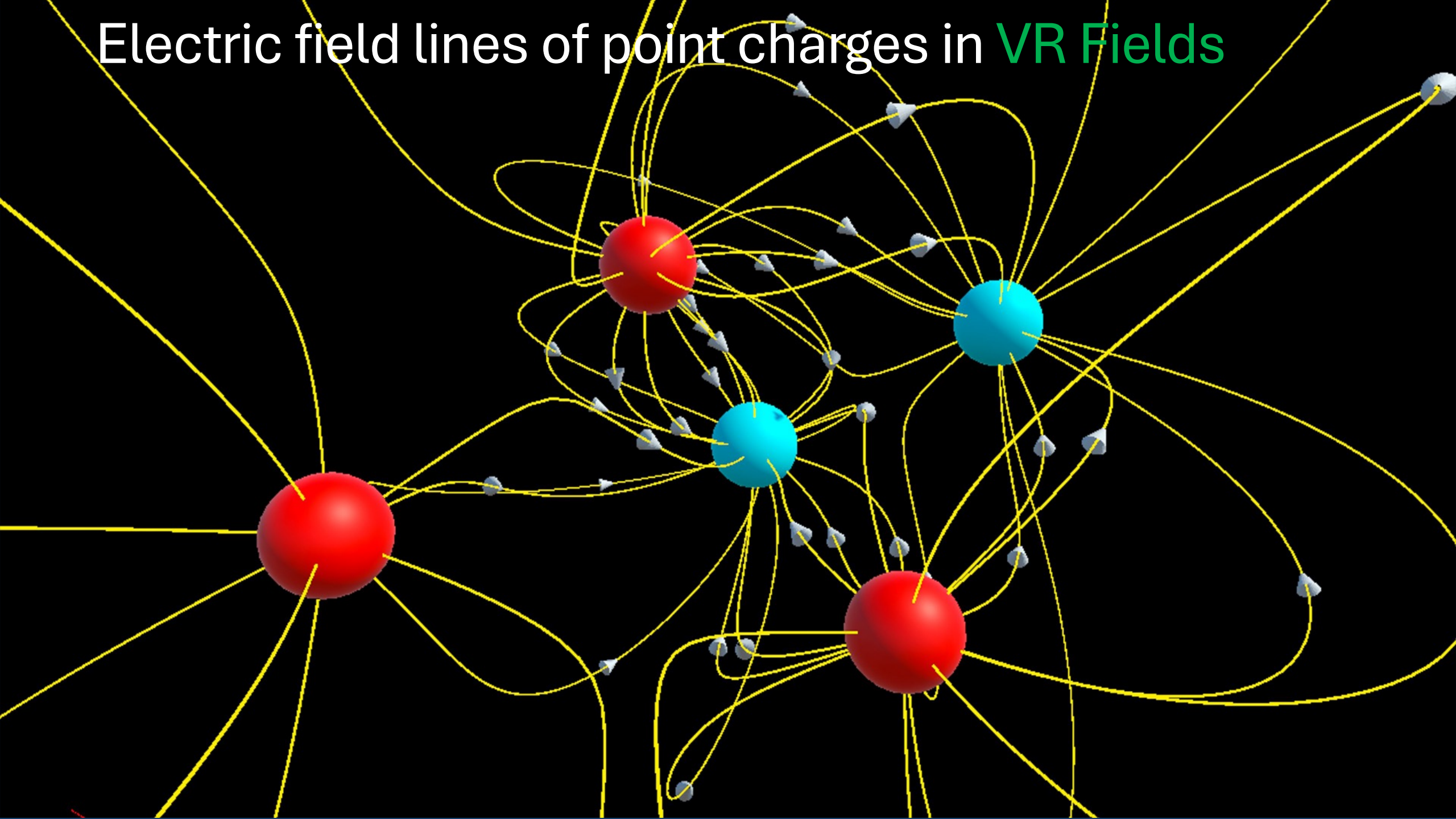
CMS detector



Explore LHC Data with VR Spy

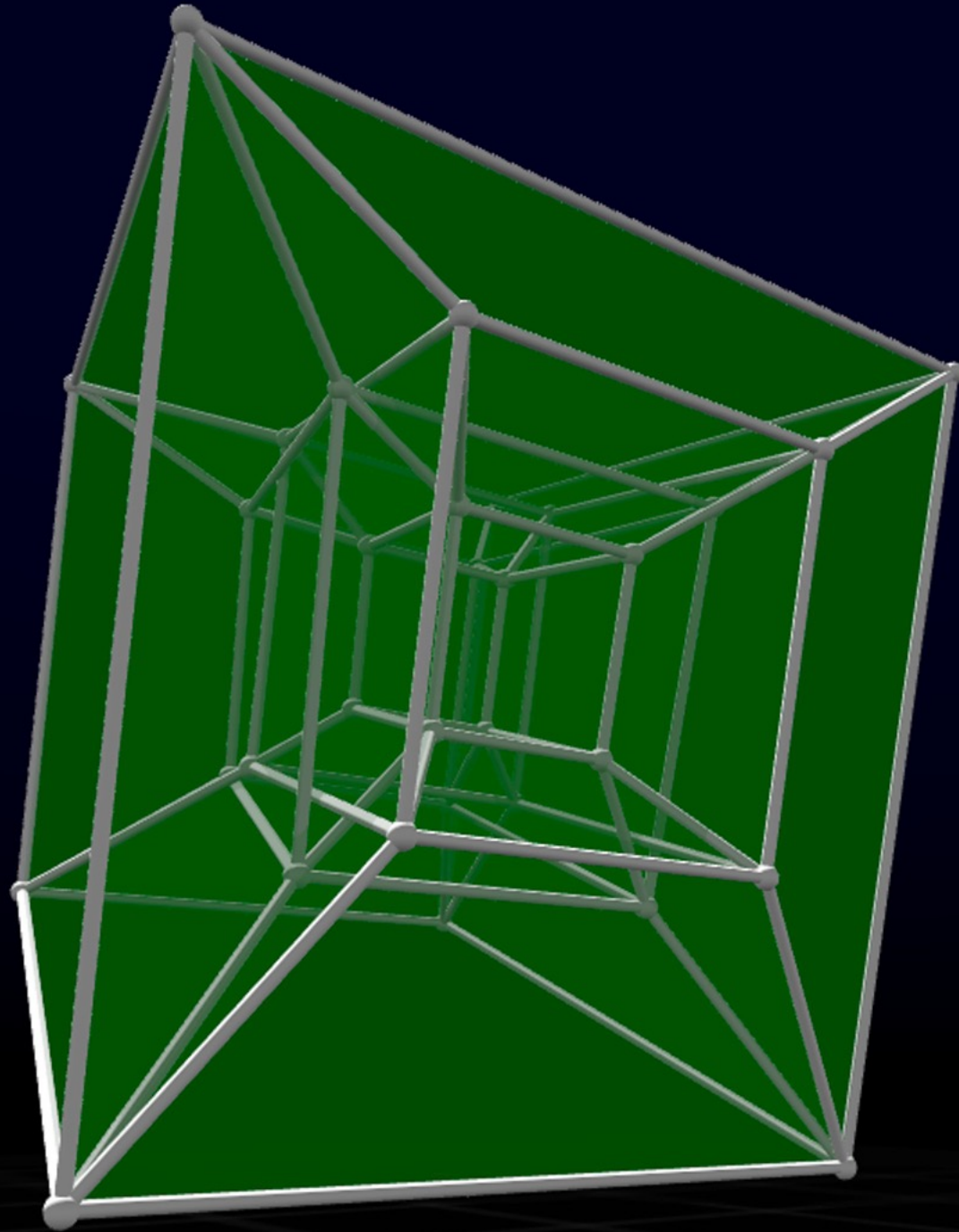


Electric field lines of point charges in VR Fields



- VR Fields new additions:
 - Electric field lines of relativistic charges
 - Magnetic field lines of a line of current

Hypercubes



Data VR

- In Virtual Reality, we can see 3D data
 - We learned that scatterplots in VR are great – on 2D screens we can make sense of, at maximum, maybe 1,000 data points. In VR, because of changing perspective, we can make sense of maybe 50,000 data points
- Adding a 4th variable as time allows us to visualize 4D as a movie
- One can add a slider to vary the 4th variable however we wish
- Additional variables can be added as sliders
- Data VR is a simple example of this, using a mathematical function