

Into the Higgs Particle 3D

Teaching the Higgs Particle through 3D simulation

Lesson

Teaching the Higgs Particle through 3D simulation

Objectives

- 1) Students will gain a basic understanding of the Higgs Particle through 3D simulation and visualization,
- 2) Students will gain a deeper understanding of the discovery of the Higgs Particle.

Activity

Students travel through the collision that resulted in the Higgs Particle in real-time 3D, helping them to visualize and understand its discovery.

Materials

Higgs Particle3D Homepage

(click or cut and paste URL into browser)

<http://www.sunrisevr.com/higgsparticle3d>



3D Simulation and Investigation

3D simulations are designed to make subject matter more engaging to today's technology-savvy kids, and help them bridge the gap between the "concrete" world and the abstract world of concepts. When students experience complex subject matter in real-time 3D it becomes clearer. Students learn best when they are actively immersed in subject matter from a variety of different viewpoints; 3D simulation is designed to help students visualize difficult ideas and objects through investigation at any scale (atomic, cellular, planetary, conceptual, etc), and doing things that would normally be impossible.

Required Technology

- PC/Tablet

Optional Technology

- Projector
- Multiple Computers
- Internet Connection

Grouping

- Large Group Instruction
- Small Group Instruction

Staging

Check computer/Tablet for Internet access if needed

Procedure

1. Access program
 2. Pick a lead student navigator to control movement through the Higgs Particle collision
 3. Pick a lead student reader to read information about the Higgs Particle as it appears on-screen
 4. Begin the lesson by asking students what they already know about the Higgs Particle; write responses on the board
 5. Review basic facts about the Higgs Particle including:
 - It was discovered in 2012
 - It is called the 'God particle' because its discovery could help to solve many fundamental questions about the formation of the universe
 - A particle is a basic building block of the Universe
 6. Start traveling through the program, facilitate discussion by asking students where the class should go
 7. Use the 3D simulation as a visual aid; explain information as needed
 8. Have students pay special attention to:
 - How the particle appears and disappears very quickly
 - How the Standard Model of the 1960's predicted its discovery
 9. Have a final wrap-up with students with a question and answer period about the Higgs Particle. Ask them what it is, why it is important, and how it was discovered
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Optional Activity: 3D Scavenger Hunt + Discussion

Have students find a particular aspect of the Higgs Particle, such as the Standard Model. If students are on multiple computers, have them “race” to the part of the program the teacher wishes to highlight. Once students find/arrive at the location, the teacher may commence discussion. Repeat in other areas of the simulation as desired to build understanding.

Homework/Review

Students may also access the program outside the classroom to supplement textbook questions

Functional Notes

- The program is available on multiple platforms
- If using the program online, please ensure the Unity3D Player is installed on the computer; through the Internet Explorer Browser; download the latest at <https://unity3d.com/webplayer>.
- If you see something in **red** you can probably click on it
- For ease of use you can go through most 3D objects, and even the ground
- The school library can request and access programs (free) at www.sunrisevr.com for off-line use via PC and Mac if there is no internet connection