Not covering–
Stellar Parallax? Compton scattering?
Bohr model of hydrogen (not explicitly)
Electron tunneling

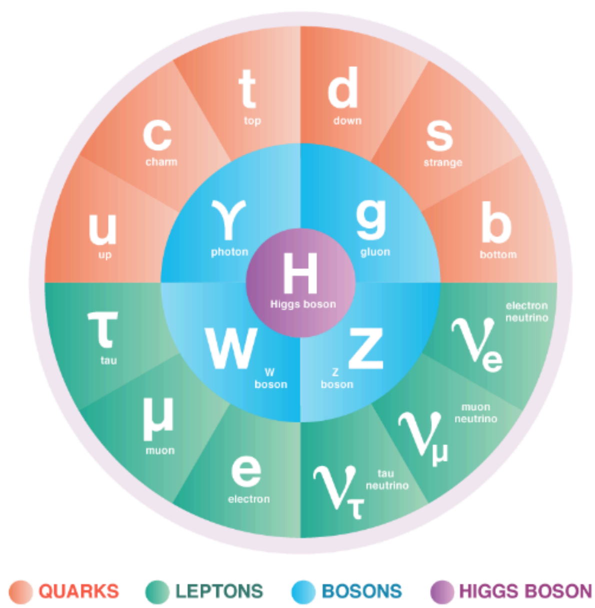
5min set-up
15min on Rutherford scattering

Rutherford scattering: show PhET simulation

High-energy particles do NOT follow the rutherford scattering formula–when the alpha particles get close enough, some other force is pulling them IN towards the nucleus instead of pushing them away. What force is that?

Students complete reading: http://hyperphysics.gsu.edu/hbase/Nuclear/rutsca3.html

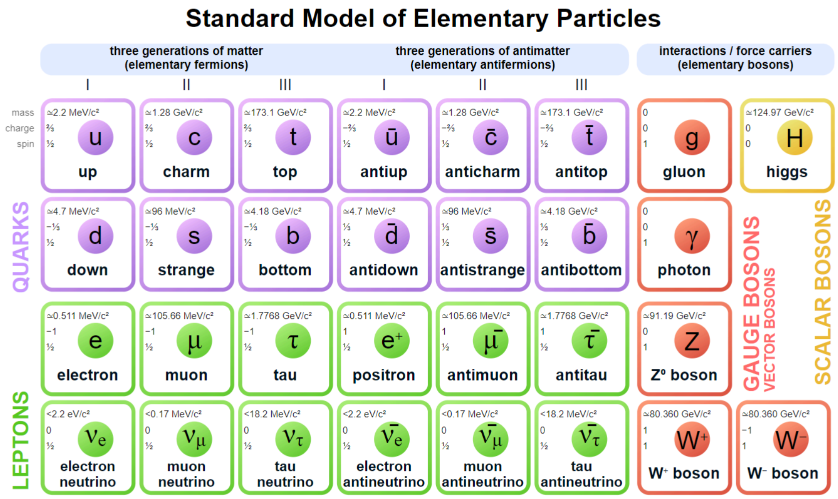
15min on Particles



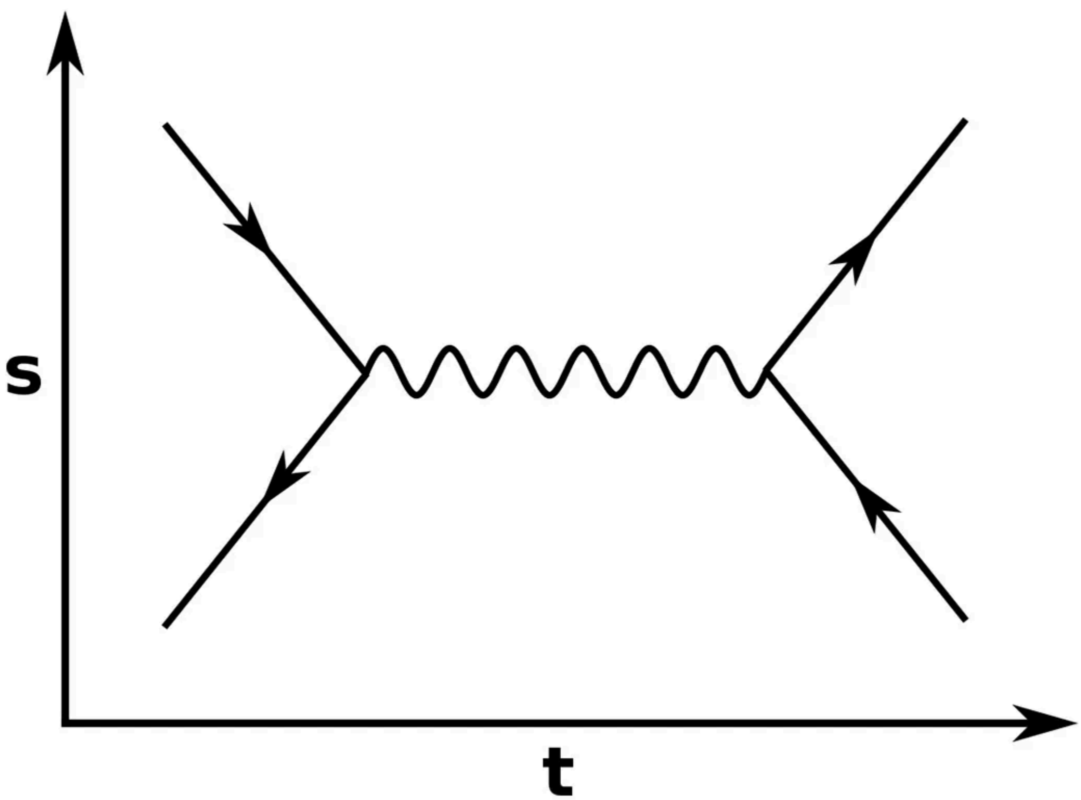
Check out the standard model.

Do you remember which particles are created in beta decay? Do you remember what force drives that interaction? [watch video https://www.youtube.com/watch?v=ehHoOYqAT_U]

Revisiting the standard model with antimatter



Pair interactions: electron and positron annihilate, becoming pure energy. Pure energy can undergo pair production, making an electron and a positron appear.



15min on Quantum physics

Remember that video of a circle creating sine and cosine waves? That's also a good representation of light! Light is a wave in both the electric field and the magnetic field (hence calling it "electromagnetic radiation.") In fact, all waves are. We can represent that with an equation, which you'll see in this video: https://www.youtube.com/watch?v=sOI4DlWQ_1w

Did you notice that the video talked about the area under the curve as a probability that we'll find the particle in that location? What does that mean? [discuss]

The probability functions apply to properties besides position, too. However, we can only know so much about a particle at a time–so the more certain we are about our position, the less certain we are about momentum, and vice versa. Energy and time are also paired up like this. (have uncertainty principles written on board) connection to superposition

5min wrap-up