QUESTIONS & ANSWERS

1. LHC

What happens with all the energy that is released when the particles collide in the LHC? Or is it not a problem, are there too few collisions for it to be a problem?

2. AMS

How do we know that we can use the same detectors for dark matter as for matter? How is dark matter affected by electromagnetism?

3. Particle physics

a) The standard model - especially the vector bosons: what are they, how they mediate the strong and weak interactions

b) What does it mean to be a "force carrier"?

c) Feynman diagrams - more examples please!

4. How do the detectors determine the various particles that arise in a collision? How do you know which kind of particle they are, and what characteristics do you use to identify them?

5. What criteria must be met for a discovery to be considered scientific evidence and not a statistical anomaly? If the detector picked up interesting new founds, when can other explanations be excluded, when can you be sure that these are the articles, you are looking for?

6. Presentation "Introduction to particle physics, part 1" covers, among other things, the wave function. What is the relationship between the wave function and the Schröding equation?

7. If the graviton where to be found, it would describe gravity at the quantum level. What is the connection or difference between gravity and the Higgs field? Both are about mass, but what are their different roles?

8. Introduction to Experiments

a) When detecting muons, are "all" generated muon particles caught by for example the CMS?

b) How are the muons able to penetrate several metres of material (losing little energy)?

9. Experimental Program at CERN

a) Are there theories that explain why and how the anti-matter disappeared after the Big Bang?

b) Is there currently a method that can be used (or is being used) to transform radioactive waste at CERN?

10. During the first hour of the day we started to go through the slides from the second part of the ”Particle Physics Lecture” in our group which lead to some interesting discussions. We had some trouble understanding the concepts of symmetry and invariance. Are there any examples of this in a transformation? Also, it may have to do with troubles understanding the Lagrangian so maybe we need some basic understanding or examples of this first.

11. Some of us have experienced troubles introducing the concept of E=mc^2 to our students. Are there perhaps any ”easy” way of explaining how the formula derives from the special theory of relativity, or any other ways of introducing it to students?

12. A concrete idea also came up for a calculation example to implement directly in physics teaching: What wavelength is required for an electron to distinguish the three quarks in a nucleon?

$\lambda = h/p = h/\sqrt{2m_e E_{kin}}$ = Planck/$\sqrt{}$2x9.109 x10^{-31}x 20 x 1.602 x (electric charge of e^-) x 10-(20 GeV) … = 10^{-17} m

13. What is a kaon?

A type of meson (2 quarks) which consists of a strange quark and either an up or down quark or their antiquarks – 4 types: K^+, K^-, K^0, anti K^0

Important for understanding that physical laws are identical for matter & antimatter

14. Higgs boson, what are the properties of it, we would like to understand more about its contribution to the mass?

15. Why is there more matter than antimatter in the universe?

17. How can religion explain latest discoveries in particle physics?