

## Beyond the standard model of particle physics with the LHC

Speaker: Caroline COLLARD

In this talk, I will start from the Standard Model in particle physics, describing the infinitely small world of elementary particles. I will discuss the current questions that the Standard Model does not answer, which tend to indicate a need to go beyond the Standard Model. I will more concentrate on the experimental point of view: How can we access the infinitely small world? What can we see with a detector of particle physics? How do physicists expect to discover new physics beyond the Standard Model? I will present the Large Hadron Collider which is in construction at Cern, and one of the 4 experiments where collisions of particles will be studied: ATLAS.

### References of a review paper

John Ellis, « Beyond the standard model with the LHC », *Nature* 448, 297-301 (19 July 2007)

### Interesting web sites:

- <http://particleadventure.org/frameless/startstandard.html> and in particular
- [http://particleadventure.org/frameless/beyond\\_start.html](http://particleadventure.org/frameless/beyond_start.html)
- <http://www.sciencemuseum.org.uk/antenna/bigbang/huntforhiggs/index.asp>

- **LHC**: Large Hadron Collider at Cern. It is a circular machine in which 2 beams of particles will travel in opposite directions and collide in 4 interaction points around its circumference. These particles are hadrons (proton or ions). The LHC is called large because of its size (27km of circumference).

- **TeV**: energy in particle physics:  $1 \text{ TeV} = 10^{12} \text{ electronvolts} = 10^{12} \times (1.602 \cdot 10^{-19})$   
joules =  $1.602 \cdot 10^{-7}$  joules