Liverpool VELO starts Tour de France to CERN

Imagine standing in front of an exploding house and measuring where all the debris is going as it rushes past you, in the hope of reconstructing a vase that you think might have stood in the upstairs front left bedroom. Particle physicists at the University of Liverpool are building a device called the VELO to do exactly that at the subatomic scale.

The VELO is so precise that it can detect the position of particles passing through it to better than a hundredth of a millimetre. Not only that, but it is capable of doing so forty million times a second, which is how often mini particle explosions in its future home, the LHCb experiment, produce particles that fly through it at almost light speed. The vase that particle physicists are trying to find in this case is a type of fundamental particle called a b quark. The key to identifying a b quark (which lives for a millionth of a millionth of a second) is to reconstruct the very short distance it traveled in that time – that's why the VELO has to be so incredibly accurate if it is going to do its job.

The quest driving the LHCb experiment is to understand antimatter, and why there's so little of it in our universe. It's thought that when the universe was created in the Big Bang matter and antimatter were created in equal amounts. Luckily for us (otherwise we would instantly annihilate when we met antimatter) matter predominates today, although no one knows why. Physicists believe that the answer to this conundrum may be concealed in the behaviour of b quarks, which makes the successful operation of the VELO vital.

This week, Liverpool physicists completed the assembly of the first three (out of forty two) VELO modules. Designing and prototyping the modules has taken ten years. According to Professor Themis Bowcock, leader of the Liverpool LHCb team, "this is probably the most complicated detector of its type ever produced, and is a showcase for our scientific programme and engineering skills."

There's still the small matter of transporting the finished product to its destination at CERN, the European centre for particle physics, on the Franco-Swiss border near Geneva. Until a couple of weeks ago prototype modules were placed in special high-tech transportation boxes and couriered by air. Now, with tightened hand baggage restrictions, another solution has to be found. Professor Bowcock is driving the first two modules to CERN personally this week. Only another thirty nine modules and a few more journeys to go …..

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Also see the following:
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