# A day in the life of a Particle Physicist

*Ronan McNulty*

## 12 o'clock - My day starts at the Fermi National Accelerator Laboratory near Chicago.

***That's 12 midnight, not noon!***

The proton and anti-proton beams of the Tevatron collider circulate 24 hours a day, smashing together 10 million times a second. Each time they interact, they produce a miniature fireball, recreating conditions that last existed less than one billionth of a second after the Big Bang.

Tonight I'm part of the team operating the 'camera' that photographs the explosions. Our 'camera' is a specialised detector that took 500 physicists ten years to build. About the size of a two-storey house, we can take pictures with a precision of one hundredth of a millimeter, allowing us obtain remarkable images of the decays of subatomic particles.

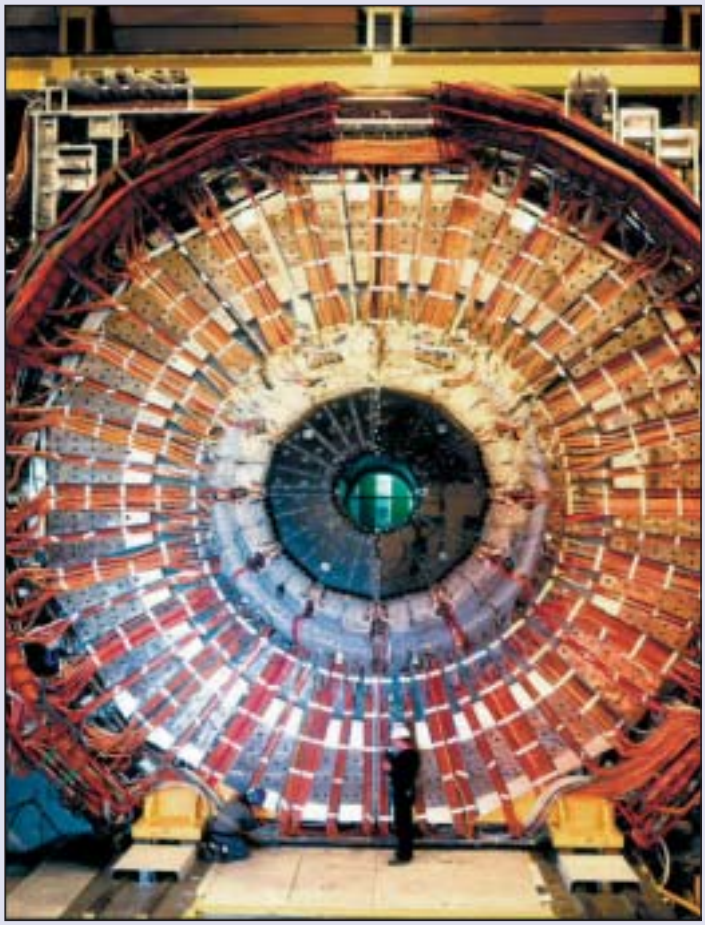
There are three of us in the control room tonight. One person co-ordinates our activities, another is responsible for storing the data, while my job is to monitor detector conditions and data quality. In front of me are eight monitors, each displaying a series of plots which so far suggest everything is proceeding smoothly.

Suddenly one of the screens flashes red - all is not well. Investigating further I discover that the voltages on one sub-detector have gone to zero. I follow the recovery instructions, but without success. After a brief discussion, we agree that to solve this we need expert intervention. We make a phone-call to the relevant expert (about 20 people are on-call 24 hours a day to solve specialist problems) and at 3:30 am, a rather tired but obliging physicist arrives and after half an hour succeeds in fixing it.

The rest of the shift is uneventful. I complete my report and hand over to the next crew that arrive in at 8 am. Time for me to get some sleep!

At 3 pm I come back to the laboratory for an important meeting. In analysing data taken over the last two years, one of the physicists thinks they may have discovered a new particle that suggests that we all live in a super-symmetric world where each everyday particle like the proton and electron has a rare super-world partner. If correct, this could be a Nobel prize-winning discovery!

Not unsurprisingly, many people are sceptical of the claim so the meeting is quite lively. The proponent of the signal makes a detailed presentation. Immediately he is presented with a barrage of questions: how well is the energy resolution known? How were the calibrations determined? Can the precision quoted be justified? Like a skilled barrister in a courtroom he defends his position, but in our case, the final arbiter will be truth itself. For every claim or counter-claim, the data itself can be interrogated for an answer.



*The DELPHI particle detector at CERN where Ronan worked for ten years. He graduated with a BSc Joint Honours in Experimental and Mathematical Physics from University College Dublin, and a Ph.D from Liverpool University.*

The meeting finishes at 6pm without a firm conclusion as to the veracity of the proposed signal, but a clear programme of work has been defined that will let us decide the issue using rigorous scientific criteria. My student volunteers to perform an important crosscheck that will settle one of the arguments. The truth lies hidden in our data, and the job of the scientist is to liberate these truths.