

Saturday

'This is a beautiful thing'



Suzanne Moore has been curious about Cern since watching the celebrations surrounding the discovery of the Higgs boson. What can it be like living and working in the mecca of particle physics? She travelled to Geneva to find out

As the tram trundles through the suburbs of Geneva, a huge lit-up globe by the side of the road lets me know I have arrived at Cern (the European Organisation for Nuclear Research). This is the mecca of particle physics. Most of it looks like a fairly undistinguished campus. The money has not been spent on the buildings. "I am repeatedly told, "The money is all underground." Underground, of course, are the tunnels where beams of light are smashed into each other. Under my feet are the colliders and detectors that are helping us understand what the universe is actually made of.

Entered popular consciousness in recent years, Geeks are pretty cool, and theoretical physics has replaced philosophy as a signifier of intellectual prowess. My 12-year-old had heard of the Large Hadron Collider. "That's where Sheldon wants to go." Indeed, a whole episode of The Big Bang Theory was about Leonard wanting to take his girlfriend to Switzerland to see the LHC, which resulted in Sheldon's paroxysms of jealousy. "But Penny has no interest in subatomic particle research! I've been dreaming of seeing the Large Hadron Collider since I was nine." I am no Sheldon, but have been wondering about Cern since seeing herds of people choosing when the announcements about the Higgs boson (many people here call it the Goddard particle) were made and a recalcitrant Peter Higgs getting the Nobel prize. "Oh yeah, sleeping bags everywhere, queues to get in," a young Canadian tells me. What do all these people do all day, I wondered, these people preoccupied by that which we cannot see?

As I sit down in the canteen - every expense spared, except for an Antony

Gormley sculptural scribble hanging outside - it is obvious these people have their minds on something higher than dinner. "Will I see anyone doing any physics?" I'm sure to myself with out having any real idea what that might look like. Next to me two guys are talking Japanese but I can hear the words "configuration", "server", "tree", "rubric". Just opposite, some young guys and an older man are actually working stuff out on the back of a napkin. This, I will soon realise, is how it is. Indeed, one of them tells me, "one of the top guys here work s everything out on the back of an envelope. So he keeps a special supply of envelopes."

These people live and breathe physics. A young woman shows me the iPad she has just been "doodling" on. It's all numbers and equations.

Carl Sagan may have said that "we are all made of stars", but here this translates as "we are all made of numbers", and if you are not a numbers person, Cern is another planet. Often when I am talking to people, they will jump up and draw a quick graph to make their point, which only further confuses me.

It takes a while to get used to the international hubbly all around - "Cernish" is the common language - and the way people will introduce themselves: "I'm accelerator". Cern, founded in 1954, has no member states, with many other countries co-operating. The atmosphere is collegial but blokey. The ratio of men to women is about 80:20, but the women I meet are well supported. There is a crèche and a kindergarten, and I see toddlers running round. The problem seems to be getting women into apprenticeships, and the UK as a whole suffers from our shortage of engineers. Once in, though, there appears to be less of an old boys' network than in many professions. "As long as you drink coffee, you are in."

Most people here - apart from the British - have four or five languages. Cern employs 2,000 people, but another 10,000 pass through, working on the four main experiments (ATLAS, CMS, ALICE and LHC).

This is a large and shifting community. People may come on student placements and then get work here. In summer the

place is full of students drinking beer outside. To five hours' regular commitment - the surrounding villages either in France or Switzerland are expensive. But it soon becomes clear that people are here for the work, and the line between work and leisure is permeable. They often work 16 hours a day, because they want to. Even in the canteen. "There is an etiquette. If they have their laptops open, it could be an ideas meeting." Claire Lee (physicist and PhD student) tells me. "Oh, they keep all hours," says Rachel Bay (product lifecycle management and document management specialist). "My office is next door to some theoretical physicists. I often see them rock up at 5.30. Or having a kip. There are no 9-5 hours."

Rachel tells me about all the clubs that Cern employees can go to. Many are keen to shake off the image of physicists as wild-haired, eccentric old men, and that image is easily disrupted when I see a hip young woman and a guy queuing for his dinner in the bottom half of a gorilla suit. "Physicists don't have the best dress sense," Rachel laughs. Indeed, it's all pretty casual. There are lots of clubs for those inclined and lots of winter sports, although some prefer to spend their spare time coding or doing robotics. Rachel asks me if I fancy some plates at lunchtime, but I want to go and see the little office where Tim Burners-Lee invented the web. Cern has also given us cloud computing. It proves to be a hassle, however, to actually get online, and I have to get approval. "Cern is under constant attack from hackers."

When I ask most people what they miss, or what they have given up to be at Cern, they look bewildered. It seems a love of physics goes hand in hand with a love of skiing and snowboarding. They love the fact their children are in local schools and are bilingual. Lucy Lockwood (HR systems analyst) has two small children, who her husband looks after, and says she doesn't have a social life, but she loves being "in this temple of physics". The problem I hear of over and over is that when a couple are both physicists or engineers, it can mean only one person gets the job they both want. Right across Cern there is movement between different roles: physicists become engineers. Everyone on an experiment will do overnight shifts in the control room. All this produces a less hierarchical way of working. It is this flattening out of traditional structures that makes this place special, as well as the daily and huge international co-operation. Scientists whose countries are in conflict work together. Palestinians besides Israelis. Steve McMahon also explains: "Research is not an issue. I may be working alongside eastern Europeans, for instance. We just don't talk about money."

The fact that the director is well paid, but not on a mega CEO/bank-type salary, helps this sense of common purpose. People are valued for their ideas and their ability to work across projects. "Hans Bix was here last week," someone will say casually. "Well, he would be. He is interested in Theorem." Or, "No one knew what to wear when the Dalai Lama came, so we wore Cern T-shirts".

science, it would be IBM or Google." Now an engineer, after some years at Cern he is quite proud he doesn't ski. Ice climbing is his thing. And zombies. Everyone I talk to smiles when I ask if, having found the Higgs, research has now stalled. The LHC is on "the long shutdown". The Higgs boson has actually thrown up more unknowns, from anti-matter and dark matter to supersymmetry and the inability of the standard model to incorporate gravity. All this work and these massive machines are about proving theories that are decades old. This is a long game. I go underground to see the CMS (Compact Muon Solenoid) particle detector, a massively complex but gorgeous piece of mega-engineering. We also see the AMS (Alpha Magnetic Spectrometer), and watching people sitting in a control room analysing data as it comes down from the International Space Station is fairly mind-blowing. A young Jordanian shows us round and tells us about Sesame, a major new research facility in the Middle East bringing in scientists from Egypt, Israel, Jordan, the Palestinian territories and Iran, among others. Its objective is partly to promote peace through scientific co-operation.

Steve McMahon (Atlas upgrade tracker leader) commutes between Cern and the Rutherford Appleton lab in Oxfordshire, and like every one here, is thankful for easy Jet. He takes me round Atlas. He seems to know everyone, stopping to chat to an old Israeli, pipe-smoking professor. As he talks about everything from humidity to his four children, to explaining the new dimensions and all the other bits of the universe to be explored (most of it)

Everywhere one feels all these minds working collectively and intently - even non-scientists like me can pick up that buzz

a Russian guy knocks on his door excitedly. He has had some good news on funding. "You know people say, 'It's not rocket science?'" says Steve. "Well, it is. He is a rocket scientist." I tell him I like the big statue of Shiva in the grounds - the old "cosmic dancer" - but I sense a lot of people don't like big expressions of cultural difference, never mind faith. Everything is for a higher purpose, and that purpose is physics. I have never been anywhere where I felt such a sense of shared purpose. It is in the canteen at lunchtime, where folk whizz about with trays of food and seemingly no system, as if they were chased particles themselves, so that one fears a collision. But there is none - just this sense of charged intensity. People talk passionately in every tongue about the problems they are solving. Everywhere one feels these minds working collectively and intently, and even someone like me, who is not really up to speed on quark, strangeness, mass and gluons, can pick up this terrific buzz. What is the universe made of? Matter and force. Or, here, concentration and caffeine. And a new kind of excitement. Real energy. I begin to understand a little of what Lucy said earlier: "We are all here for what Cern is doing. This is a beautiful thing."

The Guardian and Observer are media partners of the London Science Museum's Collider exhibition, which opens on Wednesday and runs until May 2014. More details: sciencemuseum.org.uk



Suzanne Moore at Cern, just outside Geneva in Switzerland, main; above, left to right, scientists gather for a coffee break in the canteen; a physicist at work in his office; writing UK school pupils learning about the



PHOTOGRAPH: STEFAN PANGRITZ



Compact Muon Solenoid (CMS); the children play area at the Cern cafeteria