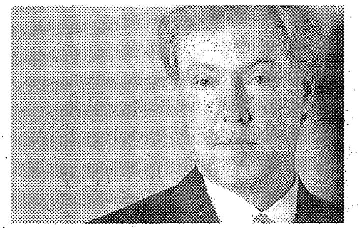
Opinion

SCIENCE

Scientists are searching for the very building blocks of creation

The search for confirmation that the subatomic world works the way physicists think it does could have been happening in the Metroplex instead of Switzerland.



JIM CHAMBLESS

I am descending 300 feet beneath Geneva, Switzerland, to the world's biggest science project, the Large Hadron Collider. The elevator stops and our guide, physicist Julia Hoffman, hands me a hard hat. We walk through a tunnel and a metal door, then onto a catwalk 30 feet above the floor of a cavernous concrete cylinder. An immense particle detector, part of an experiment that will re-create conditions in the instant after the big bang, fills the room. I reach out and touch the most complex, incomprehensible piece of machinery I'm ever likely to see . . .

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In 1989, Dallas-Fort Worth became the site for the superconducting super collider, or SSC.

World-class scientists and engineers gravitated to the Metroplex to build the 54-mile tunnel and lab. By 1993 the SSC was 25 percent complete, but Washington canceled it during a round of budget cuts, costing Texas 7,000 jobs.

The European Organization for Nuclear Research (CERN) has built the Large Hadron Collider over the last 14 years to replace the SSC.

Fred Olness, physics professor and former department chairman at Southern Methodist University, stayed in Dallas-Fort Worth after the project was canceled. We met in 2006 and, as a rank but fascinated nonscientist, I occasionally asked him about time and space and Einstein's theories.

Upon learning that Olness would spend a year at CERN working on the LHC, I jokingly asked whether he'd give me a tour. He said sure, so in June, I spent a day at CERN immersed in particle physics research.

Founded in the 1950s, CERN is the world's pre-eminent particle physics research facility, with more than 2,500 scientists and researchers on staff and 20 member states; it also supports about 9,000 scientists worldwide. The LHC is the latest and greatest of CERN's programs, seeking no less than "understanding the mysteries of how our universe is made and how it came to be," according to an LHC brochure.

The LHC's 17-mile circular tunnel, 300 feet underground, houses 9,300 magnets cooled to minus 271 degrees Celsius, near absolute zero. At full power, the LHC's beams, 30 times more intense than ever produced, will travel at 99.999999 percent of the speed of light, with energy of 14 trillion electron volts, seven times more than ever before possible.

While circling the tunnel at 11,200 revolutions per second, beams traveling in opposite directions will be crossed, producing approximately 1 billion proton-proton collisions per second. The CERN computer facility will record one event out of every 5 million, capturing one gigabyte of data per second (the equivalent of a DVD every five seconds) and then transmitting the data to researchers throughout the world.

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We are in the CERN cafeteria discussing the experiment Olness is collaborating on, ATLAS — a particle physics experiment at the Large Hadron Collider. He is explaining a particular issue with the detector and at one point holds his hands about a foot apart to illustrate the distance light travels in a nanosecond; during the time between particle interactions, light can travel only about 25 feet. As we talk, I observe several hundred of CERN's scientists and engineers. The concentration of intellectual capital boggles the mind, and the room radiates excitement and possibilities.

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As a theoretician, Olness' role is to interface with the ATLAS experimental team and interpret data from the particle collisions.

Their goal is to find the Higgs boson, which, says Olness, "is science's best guess for what gives particles mass. . . . The Higgs field fills the void and drags on particles to give them an effective mass." He added that, beyond finding the Higgs particle and affirming the standard model of subatomic physics, the LHC will search for new particles, including the mysterious dark matter that accounts for some 22 percent of the mass-energy of our universe.

The ATLAS detector is enormous: 75 feet high and 140 feet long. That something so huge looks for particles so small seems incongruous.

And, given the LHC's multibillion-dollar cost, some might add "impractical." Indeed, cost was a consideration in the SSC's cancellation, with the *Star-Telegram* reporting in 1993 that one congressman said: "The super collider is dead; the taxpayers have saved $10 billion. I think that's good news for the American public."

But the LHC is more than research and theory. Olness emphasizes that the LHC's experiments have real-world, practical applications and innovations that provide jobs and improve quality of life. Areas benefiting from LHC research, according to CERN brochures, include medicine, arts and culture, and education..

The possibility exists that the Higgs particle will not reveal itself — these are, after all, experiments.

That, Olness said, "would turn the field upside down and change the direction of future research. . . . There are many alternative theories, and they all have interesting consequences."

He concluded, with maybe a hint of a smile, "Nature can be kind, or nature can be devious."

Yet even in that unlikely scenario, the LHC will be worth the cost, thanks to the technological, economic and cultural benefits.

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It is Sept. 10 and beams have begun circling at the LHC. I smile at the hubbub about whether the LHC will cause a black hole and destroy the world, and I wish I could be there when collisions begin in a few weeks. I look at my photographs of ATLAS and CERN and ponder the engineering, the intellectual capital, the jobs, the applications, the international interest. And I think: We should have built it here.

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