TABLETOP PHYSICS PUSHED TO THE EDGE

Researchers adapt atomic-physics tricks to look for evidence of new particles.

BY GABRIEL POPKIN

It's possible that no one knows the electron as well as physicist Gerald Gabrielse. He once held one in a trap for ten months to measure the size of its internal magnet. When it disappeared, he searched for two days before accepting that it was gone. "You get kind of fond of your particles after a while," he says.

And Gabrielse has had ample time to become fond of the electron. For more than 30 years, he has been putting sophisticated electromagnetic traps and lasers to work to reveal the particle's secrets, hoping to find the first hints of what's beyond the standard model of particle physics — the field's long-standing, but incomplete, foundational theory. Yet for many of those years, it seemed as if he was working in the shadow of high-energy facilities such as the Large Hadron Collider (LHC), the 27-kilometre-circumference, US$5-billion particle accelerator near Geneva, Switzerland. "There was a time in my career when there weren't very many people doing this kind of thing, and I wondered if it was the right choice," he says.

Now, he's suddenly moving from the fringes of physics to the limelight. Northwestern University in Evanston, Illinois, is about to open a first-of-its-kind research institute dedicated to just his sort of small-scale particle physics, and Gabrielse will be its founding director.

The move signals a shift in the search for new physics. Researchers have dreamed of finding subatomic particles that could help them to solve some of the thorniest remaining problems in physics. But six years' worth of LHC data have failed to produce a definitive detection of anything unexpected.

More physicists are moving in Gabrielse's direction, with modest set-ups that can fit in standard university laboratories. Instead of brute-force methods such as smashing particles, these low-energy experimentalists use precision techniques to look for extraordinarily subtle deviations in some of nature's most fundamental parameters. The slightest discrepancy could point the way to the field's future.

Even researchers long associated with high-energy physics are starting to look to low-energy experiments for glimpses beyond the

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