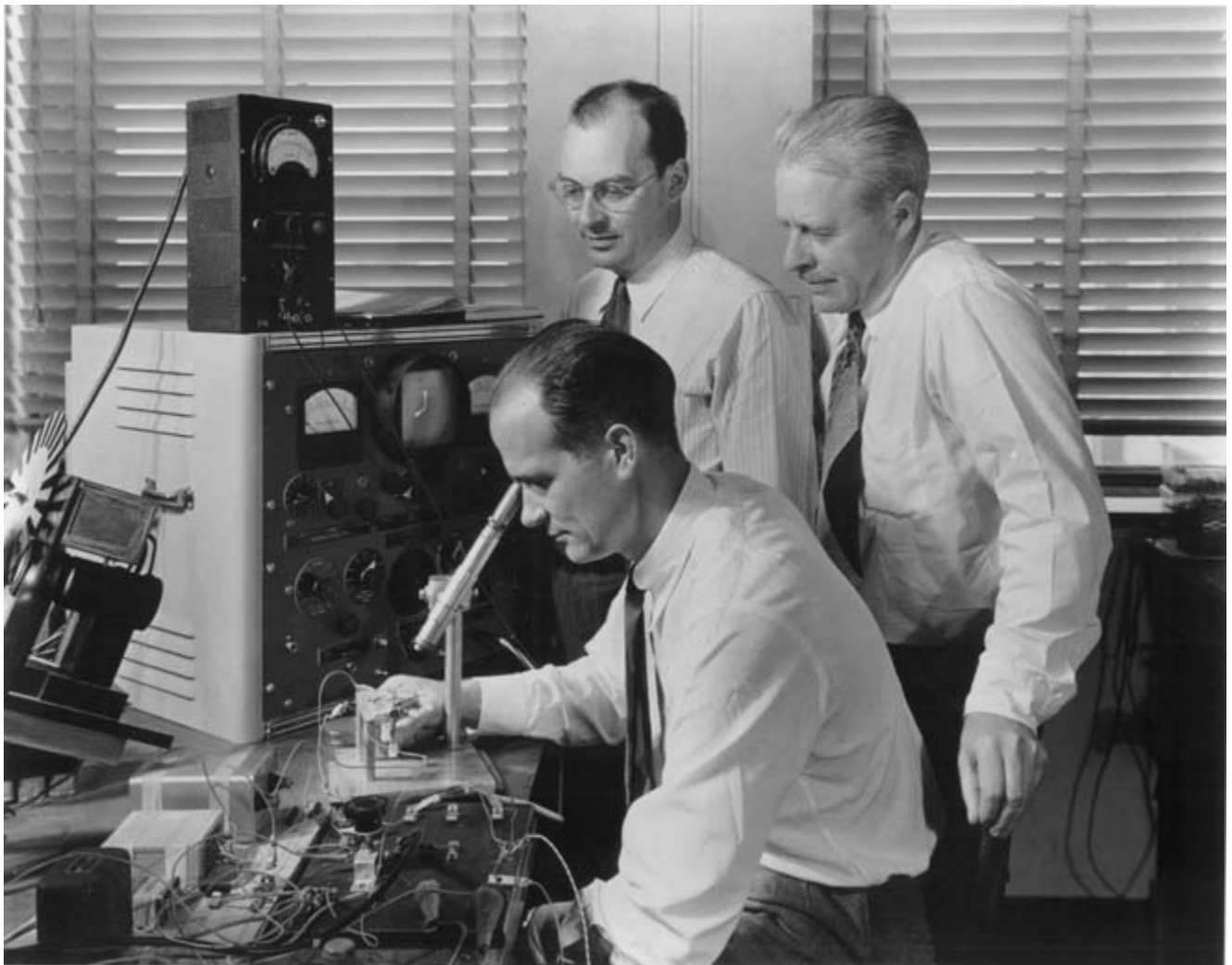


Bell Labs Kills Fundamental Physics Research

By Priya Ganapati [✉](#) August 27, 2008 | 2:29:46 PM Categories: [Research](#)



After six Nobel Prizes, the invention of the transistor, laser and countless contributions to computer science and technology, it is the end of the road for Bell Labs' fundamental physics research lab.

Alcatel-Lucent, the parent company of Bell Labs, is pulling out of basic science, material physics and semiconductor research and will instead be focusing on more immediately marketable areas such as networking, high-speed electronics, wireless, nanotechnology and software.

The idea is to align the research work in the Lab closer to areas that the parent company is focusing on, says Peter Benedict, spokesperson for Bell Labs and Alcatel-Lucent Ventures.

"In the new innovation model, research needs to keep addressing the need of the mother company," he says.

That view is shortsighted and may drastically curtail the Labs' ability to come up with truly innovative discoveries, respond critics.

"Fundamental physics is absolutely crucial to computing," says Mike Lubell, director of public affairs for the American Physical Society. "Say in the case of integrated circuits, there were many, many small steps that occurred along the way resulting from decades worth of work in matters of physics."

Bell Labs was one of the last bastions of basic research within the corporate world, which over the past several decades has largely focused its R&D efforts on applied research -- areas of study with more immediate prospects of paying off.

Without internally funded basic research, fundamental research has instead come to rely on academic and government-funded laboratories to do kind of long-term projects without immediate and obvious payback that Bell Labs used to historically do, says Lubell.

Most of the scientists working in the company's fundamental physics department have been reassigned, says Benedict. *Nature*, which first reported the news, says just four scientists are left working the fundamental physics department in Murray Hill, New Jersey. Benedict wouldn't confirm or deny that.

Computing and wireless technologies owe much to advancements in physics, though the connection may not always be immediately apparent. An example is the Global Positioning Systems or GPS.

For instance, an integral element of GPS are atomic clocks, which stemmed from the creation of the hydrogen maser.

The hydrogen maser, or hydrogen frequency standard, uses the properties of a hydrogen atom to serve as a precision frequency reference.

"GPS is based on very accurate timing mechanisms," says Lubell. "So the measure of time and the frequency standards that are used to do it date back to research in optical pumping which led to the development of hydrogen maser."

In the past Bell Labs was the place where such fundamental research that impacts the fields of both computing and physics could meet.

Bell Labs was founded in 1925 by Walter Gifford, then president of AT&T. AT&T, a monopoly, established Bell Telephone Laboratories, popularly known as Bell Labs, as a joint venture with Western Electric, AT&T's manufacturing subsidiary.

The Labs became the Mecca for researchers in science, computers and mathematics. Deregulation, however, forced AT&T in 1995 to spin off Bell and other parts of the company into Lucent Technologies. The move marked a shift in fortunes for the research arm as research budgets came to be trimmed and Alcatel-Lucent faced increasing pressure from stockholders.

"Bell Labs could do the kind of fundamental research it did in the past because it was functioning as part of a monopoly," says Lubell. "With that gone the landscape changed dramatically."

In recent years, Bell Labs' physics unit had its share of controversy when [researcher J. Hendrik Schön](#) was found to have published data in the area of molecular-scale transistors between 1998 and 2001 that had been manipulated and falsified.

That's a long way from where the Labs once stood with its position as a Nobel Prize magnet.

In 1937, Bell Labs researcher Clinton Davisson shared the Nobel Prize in physics for demonstrating the wave nature of matter.

Nearly twenty years later, in 1956 came the Nobel prize for inventing the transistor and it was shared by William Shockley, John Bardeen and Bell scientist Walter Brattain.

In the seventies, Bell Labs won two Nobel prizes in physics back-to-back in the years 1977 and 1978. Philip Anderson shared the Nobel for developing an improved understanding of the electronic structure of glass and magnetic materials. The next year Arno Penzias and Robert Wilson were feted for their discovery of cosmic microwave background radiation.

Former [Bell Labs researcher Steven Chu](#) shared the Nobel in 1997 for developing methods to cool and trap atoms with laser light. A year later Horst Stormer, Robert Laughlin, and Daniel Tsui were awarded a Nobel for the discovery and explanation of the fractional quantum Hall effect.

In the last few years, Lucent has sold its semiconductor business and that means research in areas connected to that had to be scaled back, especially in areas such as integrated circuits and Microelectromechanicals Systems (MEMS).

Meanwhile, Alcatel-Lucent continues to hack away at its jewels. Though Murray Hill in New Jersey, the company's U.S. headquarters, and the site of many great scientific discoveries remains safe, Alcatel-Lucent has sold its [Holmdel campus](#). Holmdel's technological contributions include contributions to Telstar, the first communications satellite and Chu's Nobel Prize-winning work.

Still for fundamental physics research there will be life after Bell Labs, though it will be dependent on the whims of the federal government.

Increasingly, long-term research is being carried out in universities and national laboratories with federal grants, says Lubell.

For Bell Labs, yet another chapter in its storied history of comes to a close taking the once iconic institution closer to being just another research arm of a major corporation.

Photo: William Shockley, John Bardeen and Walter Brattain invented the transistor in 1947.
(Alcatel-Lucent/Bell Labs)