edited by CONSTANCE HOLDEN

Opening Window on Quantum Weirdness

In Joseph Heller's *Catch 22* one of the officers—Army major Major M. Major—was notoriously hard to catch in his office. Whenever the protagonist, Yossarian, didn't need him, he was in; whenever he did, he was out. Yossarian might have wondered if he really existed; instead, he trapped the major slipping out his back window just at the moment when a visit had been scheduled.

That's not far from the classic conundrum in quantum mechanics. For decades, physicists have predicted that subatomic particles and certain macroscopic objects occupy several "states" at once, but only when no one's looking—a condition called a superposition of states. Indeed, theory says that the very act of observation locks the system into one of its possible states, rendering the superposition unobservable. This contention has been accepted as proved, but the evidence is only indirect.

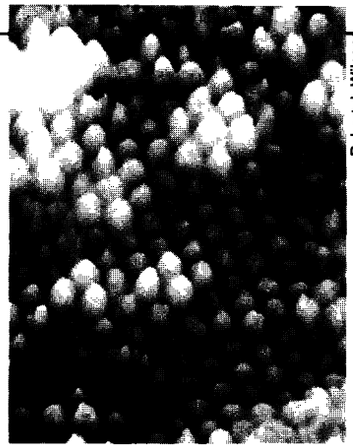
Now, a group of English physicists at Sussex University is claiming it has found a way to "see" a superposition of states. The group, led by Terry Clark, does this with a small ring of superconducting metal called a Superconducting Quantum Interference Device (SQUID). Although it contains billions of atoms, under the right circumstances a SQUID behaves like a single quantum particle, remaining in a superposition of magnetic flux states. The researchers say they can read the SQUID's magnetic superpositions by measuring the frequency shifts they induce in a nearby resonant circuit.

Although physicists have been familiar with the findings for several years, most remain unconvinced. Says Anthony Leggett, a SQUID expert at the University of Illinois: "The argument necessary to go from the raw data to their conclusions is extremely indirect and makes many assumptions along the way." He says the Sussex group may be misinterpreting a classical effect such as a magnetic resonance.

Clark and his collaborators are hoping to sway the doubters with an upcoming paper, to be published in the Italian journal *Il Nuovo Cimento*, that is based on a completely rebuilt apparatus. But experiments in quantum dynamics tend to have many conflicting interpretations, and it may be a long time before physicists agree on what the Sussex group is actually seeing.

Buckyballs for Sale

There's good news for scientists who have been dying to experiment with buckyballs, the newest sensation in chemistry. If you don't have the equipment to synthesize your own, you can now order a batch of the soccer-ball-shaped C_{60} molecules from a Tucson firm, Materials and Electrochemical Research (MER).



Robert J. Wilson

Portrait of buckyballs. *Direct image of soccer-ball-shaped molecules made with scanning tunnelling microscope at IBM.*

Researchers in dozens of labs around the world have been racing to study the unusual chemical and physical properties of buckyballs since September, when Donald Huffman of the University of Arizona and Wolfgang Krätschmer at the Max Planck Institute for Nuclear Physics in Heidelberg announced a relatively simple way to make pure samples of the material (*Science*, 12 October 1990, p. 209). "We've had dozens of orders since the first of the year," says James Withers, chief executive officer of MER, which has licensed the rights to make buckyballs from the University of Arizona.

The price tag: $1250 per gram, or $250 for 100 milligrams. Not much for a product unavailable at any price less than a year ago.

Search for ETs Gets Fiscal Reprieve

Exactly 30 years after the first attempt to detect radio signals from alien civilizations, the search for extraterrestrial intelligence (SETI) got its biggest birthday present ever. Not only did NASA stave off Congress's attempt to ax the program (*Science*, 20 July 1990, p. 249), but it also got a tripling of the annual budget to $12.1 million. Things are back on track for an October 1992 start of a search that will be more than a million times more capable than all previous efforts combined.

SETI prospects looked dim last summer, with one irate congressman waving banner headlines about little green men already being on Earth and another warning against squandering good money on "curiosity." The House responded by zeroing out SETI's fiscal 1991 budget.

That activated the seasoned SETI lobby—including science teachers, astronomer Carl Sagan, and one-time Shuttle passenger Senator Jake Garn (R–UT)—which went to work on the Senate. The outcome surprised even the enthusiasts: The Senate restored the full amount requested by NASA and added language to protect it from reallocation to other NASA programs. These provisions were included in the House-Senate conference report. If the program can continue to weather the lengthy budget process, the 500th anniversary of Columbus' discovery of America will mark the opening of a new age for SETI. Little green men, call soon.

Canada Sacrifices for Middle East

Canada will probably temporarily stop compiling statistics on its scientific research and development in order to finance its contributions—supply ships and fighter planes—to the war in the Persian Gulf. Statistics Canada, one of a number of government departments taking cuts for this purpose, is losing $4.5 million ($3.87 million U.S.) from its budget this year. Sources say that there may be no Canadian R&D statistics collected for 1990, 1991, or 1992. That's a further blow to Canadian science: Statistics in recent years have documented a decrease in R&D spending as a proportion of gross domestic product, despite government promises to the contrary.

Assessing High School Achievement

Standardized high school achievement tests—with their heavy emphasis on multiple choice questions—have long been criticized for their failure to reflect student resourcefulness and problem-solving capacities. Now, two educational research centers, in what they call "a major departure" from current practices, are developing an alternative national system of "performance-based" assessment.

The core of the plan, designed by the National Center on Education and the Economy in Rochester, New York, and the University of Pittsburgh's Learning Research and Development Center, involves three types of assessments: individual "performance examinations" where students respond to questions from examiners, individual and group projects, and portfolios of student work. Assessments will be tied to a syllabus and set of standards devised by