akin to the Defense Advanced Research Projects Agency—which prides itself on attracting daring ideas and funding them swiftly—and endowing it with $3 billion. "We need out-of-the-box thinking," says Barry Bloom, dean of the Harvard School of Public Health in Boston.

The meeting ended without a set of recommendations, but NIAID's Fauci says his institute will write a summary and pass it on to Health and Human Services Secretary Donna Shalala. Most participants, like Malegapuru Makgoba, president of the Medical Research Council of South Africa, were optimistic that tangible results are within reach: "I'm confident that we'll see an AIDS vaccine in the next 5 or 6 years."

But the lack of clear-cut plans on how to proceed left some a tad disappointed. "We shouldn't continue to have these very general meetings, where a shopping list is read out," says Richard Feachem, director of the Institute for Global Health in San Francisco and a veteran of similar gatherings, some with the same cast, over the past year. "This is a very special time," he asserts. "There's an energy now that we need to harness quickly, because it might be lost."

–MARTIN ENSERINK

QUANTUM PHYSICS

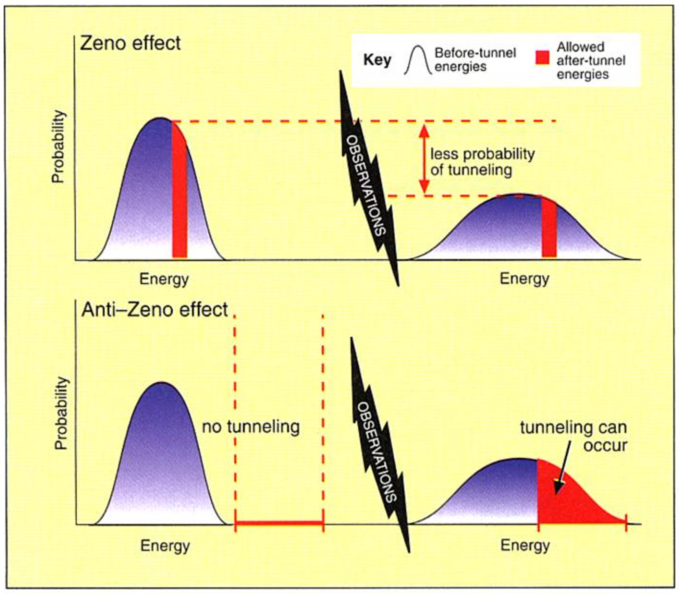
Furtive Glances Trigger Radioactive Decay

Quantum physicists love to shatter conventional wisdom—even their own. Take radioactive decay. Common sense says you can't keep an atom's nucleus from decaying simply by looking at it. Quantum mechanics says you can. Now two Israeli physicists have come up with a way in which watching a nucleus might make it decay *faster*.

The decay-preventing process, known as the quantum Zeno effect, has fascinated physicists for 25 years. It takes its name from the paradox-mongering Greek philosopher who imagined himself repeatedly interrupting an arrow's flight to chop its trajectory into smaller and smaller bits—thus proving (he thought) that motion was impossible.

In the quantum case, what is ruined by interruption is not motion but processes such as nuclear decay. Imagine an alpha particle, two protons and two neutrons, lodged inside a much larger, radioactive nucleus. The particle is there because it can't hurdle the nuclear "energy barrier" that holds it in. Sooner or later, though, the particle probably *will* escape, causing the nucleus to decay. It can do that by tunneling through the barrier, in a strange quantum way. At first, the particle is firmly stuck on one side of the barrier, but as time goes on, it "spreads out" and starts to exist in a "superposition" of bound and free states that puts it, in effect, on both sides of the barrier at the same time. From this superposed state, the particle may decide that it is on the far side of the barrier, break free, and escape.

But there's a twist. If someone observes the particle, by, say, bouncing a photon off it, whatever superposition there is "collapses," and the particle must instantly decide which state it is in—inside or outside the barrier. "You make your measurement and, bingo! You're in one and only one state," explains Peter Milonni, a physicist at Los Alamos National Laboratory in New Mexico. By repeatedly measuring and prodding the particle, a scientist can keep destroying the superposition before it gets established, drastically reducing or even eliminating the possibility that the particle will tunnel through the barrier. "The exponential decay process could be slowed down or completely interrupted by the Zeno effect," says Gershon Kurizki of the Weizmann Institute of Science in Rehovot, Israel. In short, the watched pot never boils. Physicists think they've seen this quantum Zeno effect in experiments with photons and with trapped ions.



Zeno phobia. By spreading out a particle's energy curve, observations can make it either less (top) or more likely to escape by quantum tunneling.

Now Kurizki and his colleague Abraham Kofman argue in this week's issue of *Nature* that the reverse can happen: Under certain conditions, the watched pot *always* boils. Kurizki and Kofman think of the Zeno effect as an interaction of overlapping energy states. Before tunneling, a particle can take on a certain range of energies; after tunneling, it has another range. A particle can tunnel only if those energy ranges overlap. Energy ranges, however, can change. If you knock a particle by measuring it, for example, the jolt from the photon broadens the range of energies the particle can take on. The faster you repeatedly measure the particle, the broader the range gets. With more energy options to choose from, the particle spends less time in any particular part of its range. Thus, by repeatedly observing a before-tunneling particle, physicists can ensure that it spends almost all its time at energies that don't overlap with after-tunneling energies. The result: no tunneling, and no nuclear decay.

Kurizki and Kofman realized that the exact opposite can happen. Suppose, they said, your before-tunneling energies and after-tunneling energies don't overlap to begin with. In that case, the particle can't escape. But repeated measurements might broaden the range of before-tunneling energies so that it creeps into the after-tunneling zone, allowing the nucleus to decay. "If you do it sufficiently fast, you would see an increase of the decay rate," Kurizki says. "The same procedure leads to the opposite of what is expected."

Although nobody has yet seen the anti–Zeno effect in action, Kurizki believes experiments will verify it within a few years. In fact, he thinks the anti–Zeno effect ought to be much more common than the Zeno effect—"the rule rather than the exception." If so, that could be bad news for scientists trying to develop quantum computers. Some physicists have proposed using the Zeno effect to keep quantum bits from losing the information they contain. But a repeated measurement might induce an anti–Zeno effect instead, Kurizki says. "It might have the opposite effect."

–CHARLES SEIFE

NSF REAUTHORIZATION

Closed Ethics Case Sparks Dueling Bills

A 2-year-old case of financial impropriety by a former National Science Foundation (NSF) senior staffer has exploded like a time bomb on Capitol Hill, sending the agency running for cover. The surprise battleground is new legislation to reauthorize NSF's programs, a process normally carried out with little fanfare. The dispute pits the chair of the House Science Committee, James Sensenbrenner (R–WI), against Nick Smith (R–MI), chair of the panel's basic research subcommittee. Caught in the crossfire is NSF Director Rita