

Tabletop Accelerator Breaks 'Cold Fusion' Jinx But Won't Yield Energy, Physicists Say

A crystal with a strange property is at the heart of a clever method for inducing nuclear fusion in a tabletop-sized device. The inventors of the machine—which works by firing fine beams of atomic nuclei at other atoms—are not billing it as a possible source of energy, but they say it could serve as a portable source of neutrons and of x-rays for medical therapies. Although the field of room-temperature fusion is littered with scandals and dubious discoveries, this device appears to be different: It has already won over some skeptics.

“My first reaction was, ‘Oh, God, not again,’” says Michael Saltmarsh, a physicist at Oak Ridge National Laboratory in Tennessee. “But upon reading the paper, I thought that it was really neat; it’s such a cute way of making an accelerator.”

In this week’s issue of *Nature*, Seth Putterman, a physicist at the University of California, Los Angeles, and colleagues describe the fusion device, which is about the size of a small bucket. At its heart is a little crystal of lithium tantalate—a material that has a peculiar property: It is pyroelectric.

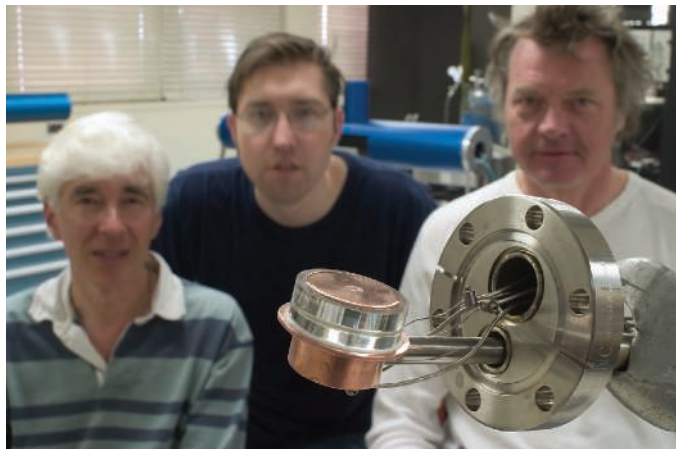
Pyroelectricity is related to the better-known phenomenon of piezoelectricity. If you squash a piezoelectric crystal, such as quartz, the electrons in the crystal rearrange themselves so that one side of the crystal becomes positively charged and the other negatively charged, creating a voltage difference between the two ends. A pyroelectric crystal does the same thing if you heat or cool it.

Putterman’s group cooled the pyroelectric lithium tantalate crystal and put it in a chamber full of deuterium gas. When they warmed the crystal with a heater, the pyroelectric effect created a huge electric field near a tungsten needle attached to the crystal. The crystal and needle essentially focused all the energy of the crystal’s heating to the very tip of the tungsten spike. When deuterium (atoms of heavy hydrogen, with a proton and a neutron in the nucleus) ventured near the tip, the field stripped off their electrons and shot the charged nuclei into a deuterium-loaded target. Some of those deuterium ions

struck deuterium in the target and fused, releasing protons, neutrons, and energy.

“Neutrons were everything to this experiment,” says Putterman, whose team spent 2 years developing a neutron detector for the experiment. “We can grab single neutrons—the actual trajectory of each neutron.” The data show about 900 neutrons per second flying away from the target with the energies one would expect from a fusion reaction. “If you look at the raw data, we maintain that it’s incontrovertible,” Putterman adds.

Saltmarsh, a neutron expert, says he is convinced but adds that the device is unlikely to be useful for generating energy. “Even if it had 100% efficiency, you can’t make net energy. The ion beam is slowing down in the



Small wonder. UCLA physicists Seth Putterman (left), Brian Naranjo, and Jim Gimzewski say their portable deuterium gun can fuse atoms.

target, and it loses energy,” more than counteracting the energy gained from fusion, he says. Saltmarsh adds that the device doesn’t produce enough neutrons yet to be commercially useful: “At this level [of intensity], it has curiosity value and lab value; it would make a good device for demonstrations. I wouldn’t mind having one in my lab.”

Putterman hopes a more refined device will produce a million or so neutrons a second. A hand-held neutron generator like that might have homeland-security applications, such as probing for fissile materials in sealed containers. Putterman says the device can also accelerate electrons into a target, producing x-rays. “A 1-millimeter crystal should be able to deliver therapeutic doses,” he says.

Whether or not the device proves useful, the idea of a simple fusion machine captivates physicists. “There [are] no moving parts,” marvels Saltmarsh. “Just heat it up.”

—CHARLES SEIFE

Congress Probes Charges of Harassment at NIH

Two congressional committees are looking into charges of sexual harassment at the National Institutes of Health (NIH). The complaints arose after National Institute of Allergy and Infectious Diseases (NIAID) staffer Jonathan Fishbein alleged that a landmark clinical trial, which found that the drug nevirapine can reduce mother-to-infant transmission of HIV, was seriously flawed.

An Institute of Medicine panel recently concluded that, although researchers failed to report some adverse events data, the NIAID-funded nevirapine trial was scientifically valid (*Science*, 15 April, p. 334). But the Senate finance committee is now following up on a complaint from Fishbein accusing a supervisor of sending profane e-mails, as well as recent depositions by two female NIAID staffers involved in monitoring the trial that allege inappropriate behavior by supervisors. The committee chair, Senator Charles Grassley (R-IA), has asked NIH for more information, citing Associated Press articles that first reported the depositions and evidence obtained by committee staff.

The matter is also under review by the House Energy and Commerce Committee, chaired by Joe Barton (R-TX). An NIH spokesperson says the agency is conducting its own investigation as well.

—JOCELYN KAISER

Two Israeli Universities Targeted for Boycott

CAMBRIDGE, UNITED KINGDOM—The U.K. Association of University Teachers (AUT) has called for a boycott of two Israeli universities said to be supporting Israel’s occupation of Palestinian territory.

After little debate, the group voted 22 April that its members—from professors to university support staff—should shun Bar Ilan and Haifa universities. The boycott’s proponents claim that Bar Ilan is affiliated with a West Bank school “in the illegal settlement of Ariel,” and that the University of Haifa has harassed a senior lecturer who guided a student’s investigation into the conduct of Israeli soldiers.

The universities deny the allegations. Moshe Kaveh, president of Bar Ilan University and a well-known physicist, called AUT’s decision “very unbalanced” and “shameful.” AUT, meanwhile, has asked members to delay implementing a boycott pending legal advice.

—ELIOT MARSHALL