RPI claims battery-fueled, room-temp fusion

Portland, Ore.--It won't power the starship Enterprise, but an experimental "dilithium crystal" pyroelectric technology is said to enable compact nuclear fusion.

Engineers at Rensselaer Polytechnic Institute ( Troy, N.Y.) have pioneered charged centimeter-sized lithium tantalate crystals that store energy at room temperature.

"In a [conventional] fusion device designed to produce energy, the plasma further heats the plasma, thereby sustaining the reaction, but we cannot use it to sustain fusion," says professor Yaron Danon.

"Instead, we plan to use the energy emitted to create applications in non-destructive testing or, possibly, in medicine," says Danon.

Indeed, Danon predicts that different application of the technology might be used in medical fields.

How it works

In the traditional fusion-reactor, high temperatures in a superheated plasma. Instead of millions of degrees Kelvin, dilithium-crystal fusion uses 100-kilovolt (deuterium) molecules onto a target, achieving nuclear fusion at low-temperature cryogenic cooling.

The fusion device depends on the piezoelectric-like (or cooling) the crystals induce a 100,000-V electric field on an insulator, but its lattice structure responds to this electric field, generating energy from the crystal, leaving behind positively charged ions.

"When you heat or cool the crystal . . . it becomes a conductor, when it becomes polarized the charge, which is big, divided thereby making the voltage swing huge--over 100 V of electric field"
Traditional portable neutron sources are at least a supply that can deliver 250,000 electron-volts. Instead 200,000-V electric field by opposing two pyroelectric crystals. Whenever the pyroelectric crystals are heated they naturally produce the high-voltage field.

"We don't require external high-voltage power supply to heat the crystal to get its high-voltage output; our device is only about 15 x 15 centimeters, and predict our next-generation device can be much smaller--only about 2 x 1 cm."

By using the field to accelerate deuterium oxide atoms, engineers fused two deuterium atoms into helium, neutron particles--the hallmark of nuclear fusion.