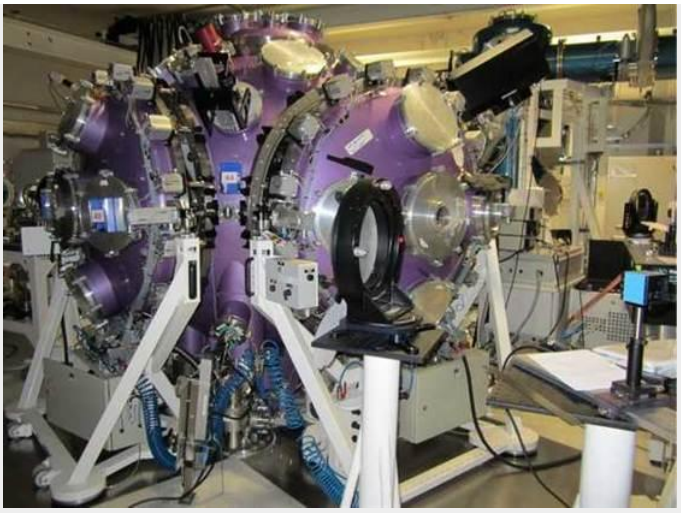
Nuclear Without The Neutrons

Nuclear fusion laser-beam experiment



The experimental chamber in which the proton-boron fusion reactions were produced. Photo Christine Labaune

I was discussing with a scientist friend of mine that I could not support that current LENR research was a nuclear reaction. No smoking gun in high energy neutron emissions. Then I came across the following article.

Scientists have demonstrated a new technique for nuclear fusion, the process that fuels stars like the sun, that doesn't produce hazardous particles.

The new experiment coaxeda boron atom to fuse with a hydrogen nucleus, using a little help from incredibly powerful laser and proton beams. The fusion produced alpha particles, which are more easily converted to usable energy than the high-energy neutrons produced by prior fusion methods.

High-energy neutrons can also produce radiation if they fuse with other nuclei to form radioactive elements.

In nuclear fusion, heat and pressure force two atoms to overcome their intense repulsion to form one atom, releasing a huge amount of energy in the process. For 50 years, scientists have chased the dream of producing limitless, clean energy from nuclear fusion.

“This is really the Holy Grail,” said study co-author Christine Labaune, a physicist for the École Polytechnique in France.

Fusion requires incredibly hot temperatures, sometimes in excess of 100 million degrees Celsius (212 million degrees Fahrenheit). Most efforts have focused on fusing deuterium and tritium, heavy forms of hydrogen, to form a helium atom, because that reaction can occur at high rates even at relatively cool temperatures. But the process also releases high-energy neutrons, which must be contained by heavy-duty shielding material, which then becomes radioactive when it interacts with the neutrons.

What’s more, after 40 years of efforts, the deuterium-tritium reaction hasn’t quite reached the break-even point, in which the amount of energy produced by the fusion reaction is equal to the energy put into it, said Peter Thirolf, a physicist at the Ludwig-Maximilian-University of Munich in Germany who was not involved in the study. (Scientists at the National Ignition Facility in Livermore, Calif., recently announced that they are very close to nuclear fusion’s break-even point, and that the barriers to achieving it are engineering-related, rather than physics-related.)

New technique

But Labaune and her colleagues have chosen to focus instead on completely different fusion reactions. Taking advantage of the fact that lasers are ever more powerful over the years, the team briefly pulsed a focused laser beam with incredibly high energy at a plasma of boron-11, an isotope of boron with an extra neutron. Meanwhile, another intense proton beam bombarded the boron plasma from another direction.

The boron isotopes fused with the laser-driven protons to produce beryllium and alpha particles, which are made up of two protons and two neutrons bound together — a key signature of the fusion reaction. The new experiment has already produced orders of magnitude more energy than a past experiment with boron fusion. **And unlike high-energy neutrons, the alpha particle energy can be contained easily and converted into electrical current that could then be used in other processes**, Labaune said.

The experiment is an exciting step, but it’s still a proof of principle, Thirolf said. Even on a small scale, however, it could eventually prove useful to study the fusion processes churning at the hearts of stars, he added.

Source: http://revolution-green.com/nuclear-without-neutrons/