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Fusion Technology Institute Director Gerald Kulcinski with the IEC device

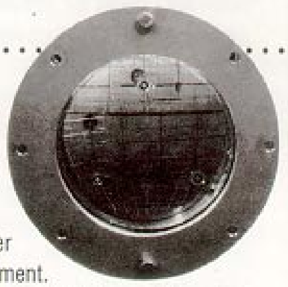
FUSION RESEARCH generates medical solutions

On the journey to making fusion a viable, nonradioactive energy source for electricity, Grainger Professor Gerald Kulcinski hopes to capitalize on some of its medical uses.

Currently Kulcinski, Senior Research Scientist John Santarius, Associate Research Scientist Bob Ashley and graduate students Greg Piefer and Murali Subramanian are exploring the second-generation fuel, helium-deuterium, which generates less radioactivity than the first-generation deuterium-tritium reactions. To confine the new fuel, they use an inertial electrostatic confinement (IEC) device that consists of a vacuum chamber, highly negative inner spherical grid and slightly positive outer spherical grid. The experiment's new 200 kV power supply, donated by engineer-inventor Wilson Greatbatch, can generate higher energies the researchers need to work with the advanced fuel. In the device, they ionize gases in the outer grid, producing positive ions that attract to the negative grid. Rather than collide with the largely transparent grid, most of the ions pass through it toward the center, where many of them collide and possibly result in fusion. Kulcinski views this work as a stepping-stone to the third-generation, completely nonradioactive helium-helium reactions, which take place at temperatures hotter than the sun.

He also sees it as an opportunity for progress in the medical field. His group can use protons from the reactions to make short-lived isotopes for therapies such as isotope implantation to treat prostate cancer, or diagnostics like positron emission tomography, which allows doctors to view organs' chemical functions. The challenge is meeting the demand for isotopes and supplying them with the correct half-life, and Kulcinski hopes to develop a portable "desktop" IEC device that can make isotopes to order at bedside or in the operating room.

Greatbatch gift funds FTI power source



Engineer-inventor Wilson Greatbatch has donated $100,000 to the Fusion Technology Institute to study advanced fusion fuel cycles. With his donation, the institute purchased a 200 kV power supply that generates higher energy than the FTI's current equipment. It will enable researchers here to study 3He-based fuels, which someday may provide nuclear energy without nuclear waste. Greatbatch, who invented the implantable cardiac pacemaker, became interested in the 3He-based fusion fuel cycles more than 10 years ago. He is a member of the National Academy of Engineering and holds more than 150 U.S. and foreign patents.