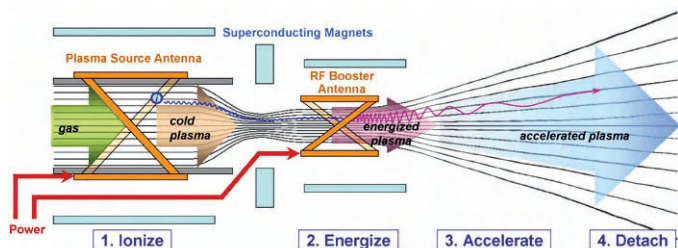


PLASMA ROCKET MAY BE TESTED ON THE INTERNATIONAL SPACE STATION

NASA signed a Space Act Agreement with the Ad Astra Rocket Company in Texas on Dec. 8, which could lead to the testing of a plasma-based propulsion system, aboard the International Space Station. The Variable Specific Impulse Magnetoplasma Rocket, or VASIMR, was developed by former astronaut Dr. Franklin Chang-Diaz. Its ultimate goal is to use a fusion reactor to provide the plasma for a revolutionary propulsion system, reducing the travel time for a manned mission to Mars from months, to weeks.

In the proposed space test, a conventional source of electricity would be used to heat an ionized fluid, which would serve as a propellant, creating a small thrust from the engine. See www.youtube.com/watch?v=-537-RJb80 for a NASA video on VASIMR with Chang-Diaz.



Ad Astra's diagram of the VASIMR Rocket. The Plasma Source cell involves the main injection of a neutral gas like hydrogen to be turned into plasma and the ionization subsystem. The RF Booster cell uses electromagnetic waves to energize the plasma to the desired temperature. The Magnetic Nozzle then converts the plasma energy into directed motion and ultimately useful thrust.

FUSION PIONEER PROPOSES 10-YEAR PLAN TO BUILD A FUSION PLANT

Fusion scientist John Nuckolls proposed "A 'Yes we can' 10-Year Inertial Fusion Energy Development Strategy," which he said could be accomplished with 10 percent of President-elect Obama's \$150 billion projected 10-year energy program. He suggested "four steps to fusion power: build an efficient high average power laser module, a target factory module, and a fusion chamber; build a surged, heat capacity inertial fusion energy system; build a fusion engine; and build a fusion power plant."

Nuckolls, emeritus director at Lawrence Livermore National Laboratory, made the proposal at the annual meeting of Fusion Power Associates, Dec. 3-4, where he and fellow fusion pioneer Richard F. Post were presented with FPA Special Awards for their "pioneering contributions to fusion energy development." Post and Nuckolls have been active fusion researchers since the 1950s, and both have made important contributions to magnetic and inertial fusion, respectively. The FPA meeting also hosted a 90th birthday celebration for Post.

Post commented: "We have the basic scientific understanding, the computational horsepower, and the technology to take a new, broader, look at the problem. And we certainly have the financial wherewithal. For example, we are spending \$700 billion a year to import oil. One week of that rate of expenditure—\$11 billion—is equal to the entire U.S. magnetic fusion funding over its 56 plus years of existence. A .4 percent tax on that oil could pay for a fusion budget that is a factor of 10 larger than the present budget."

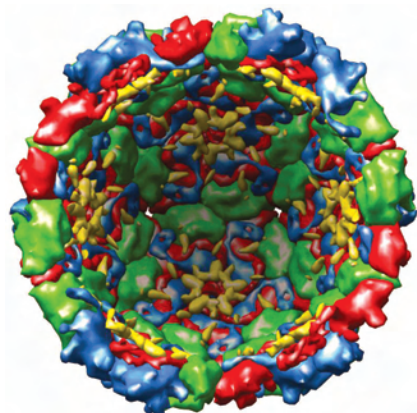
The FPA conference presentations are available at <http://fusionpower.org>.

X-RAY BEAMS REVEAL STRUCTURE OF CANCER-FIGHTING VIRUS

Viruses are known to have specificity for certain cell or tissue types, as well as host species preferences. These specificities can make them potentially powerful tools in targeting human diseases such as cancer. A picornavirus recently isolated from tissue cultures, and christened Seneca Valley virus, shows an extremely high selectivity for small cell lung cancers and certain other neuroendocrine tumors with minimal toxicity. The virus-based therapy has been developed by Neotropix, Inc. of Malvern, Pa., and is now in clinical trials. (See <http://www.neotropix.com> for more details.)

Recently, in an effort to find out how the picorna virus works, a group at The Scripps Research Institute, led by Dr. Vijay S. Reddy, used the BioCARS (<http://cars9.uchicago.edu/biocars/index.html>) X-ray beamline at the Advanced Photon Source at Argonne National Laboratory to build three-dimensional images of the virus. The imaging is a first step in identifying regions on the virus coat important for attachment to cancer cells, Reddy said. "It will be critically important to find out what region of its structure the virus is using to bind to tumor cells, and what those cancer cell receptors are. Then we can, hopefully, improve Senecavirus enough to become a potent agent that can be used with many different cancers."

These 3-D images have joined hundreds of others in the Scripps database, Virus Particle Explore, which can be accessed at <http://viprdb.scripps.edu/>.



Courtesy of Scripps Research Institute

Inside 3-D view of the Seneca Valley Virus-001 showing the icosahedral structure of the capsid and the arrangement of major proteins.

MT. WILSON OBSERVATORY CELEBRATES TELESCOPE CENTENNIAL

Mount Wilson Observatory's historic 60-inch telescope, which celebrated its 100th anniversary in December, marked a revolution in astronomy in the early 20th Century. Commissioned by astronomer George Ellery Hale under the auspices of the Carnegie Institution of Washington, it was designed by astronomer George Ritchey and took more than 14 years to complete. The telescope demonstrated that large silver-on-glass reflectors were practical, and became the basic design for all future observatory telescopes. Designed to operate in several different optical configurations for research purposes, it was the first telescope built primarily for photographic and spectrographic use. Its five-foot-diameter mirror made it the largest telescope in the world until 1917.

In the early 1900s, the Hale telescope made the first measurement of the Milky Way galaxy's size and the Solar System's position within it, including Earth. This discovery was made by astronomer Harlow Shapley, who used the telescope to observe globular star clusters and variable stars to determine the distances to these stars. He found they were distributed spherically with respect to the Milky Way, and that the Sun was not in the center of their distribution. Shapley reasoned that the Sun must thus also not be at the Milky Way's center.

The 60-inch telescope, now retired, is the world's largest telescope devoted to public viewing. More information on scheduling access is available at www.mtwilson.edu.

NEW SCIENTIST ADVOCATES OPTIMAL GREEN 'FINAL SOLUTION'

There's nothing new or scientific about *New Scientist's* Malthusianism. In answer to the question, "What is the single most effective thing I can do for the environment?" the British weekly stated: "Over a 75-year lifespan, the average European will be responsible for about 900 tonnes of CO₂ emissions. For Americans and Australians, the figure is more like 1,500 tonnes. Add to that all of humanity's other environmentally damaging activities and, draconian as it may sound, the answer must surely be to avoid reproducing."

ARTHUR KANTROWITZ, MULTI-FACETED SCIENTIST, DIES AT 95

Dr. Arthur Kantrowitz, who died Nov. 29 at the age of 95, made discoveries at the frontiers of science and technology all his life, and held 21 patents. Trained in fluid dynamics, in the 1950s he invented the use of ablative cooling to allow the reentry of missiles, and then spacecraft, through the Earth's atmosphere. Kantrowitz did early research in fusion, and helped design the intra-aorta balloon pump, which has been used on 3 million heart patients (including himself).

Kantrowitz taught at both Cornell and Dartmouth, and he founded and directed the Avco Everett Research Laboratory in Massachusetts. His work at the laboratory included research on high-energy lasers and magnetohydrodynamics. In 1958, Kantrowitz and space visionary Krafft Ehrlicke presented a joint proposal before Congress for a manned space station.

A member of the National Academy of Sciences, Kantrowitz was as at ease discussing the philosophical roots of science, as he was in talking about almost every field of science. His passion for many years was to remove "ideology" and environmentalist irrationality from science, through the use of "Science Courts."

Kantrowitz decried the "timidity" of science, in an article he wrote for the March-April 1990 issue of *21st Century*, on "The U.S. Space Program and the Ming Navy." "In spite of a clear historical record showing that adventurous, science-based technology has discovered and *created* new resources even faster than their consumption by a wasteful society," he wrote, "a governing segment of our society has embraced facile computerized resurrections of Malthusian 'limits to growth' doctrines."



Craig Mathew/Mathew Imaging

The historic Mount Wilson 60-inch telescope. Inset: Brothers Sam (left) and Brack Hale look through the telescope founded 100 years earlier by their grandfather, pioneer astronomer George Ellery Hale.



Arthur Kantrowitz (1913-2008).