America's Scientists Need Us! A Visit to General Atomics

by Jason Ross, LaRouche Youth Movement

America's top scientists need us!

Through *21st Century Science and Technology,* members of the LaRouche Youth Movement in Los Angeles set up a trip to General Atomics' verdant San Diego location, for a top-level tour of the facilities. This company is *incredible:* they do everything that we talk about—maglev, nuclear power, fusion research, creation of hydrogen fuel from water, and, of course, terrorist-killing, Hellfire-missile-armed Predator drone planes!

First, we spent about an hour with the director of energy and technology development, who gave us an overview of the history of General Atomics (GA) and of its largest projects. These include the TRIGA research nuclear reactor, developed half a century ago, and their famous DIII-D fusion research device.

GA has developed a neutron camera, similar to an X-ray camera, but with nearly the opposite penetrating properties: While dense substances like metal will stop X-rays, it is light things that stop neutrons. This camera allows you to look through the shells of mortars, for example.

Magnetically levitated rail for Pittsburgh is one of GA's projects, as is using the linear stator motor idea from maglev to make a linear motor to launch aircraft! Presently, aircraft carriers use a complex system of steam cylinders to launch aircraft off their short decks. This new technology can halve the number of crew required to handle the launches.

GA also made a device to simulate the electromagnetic signature of a large ship, which is placed on a fast boat which whizzes through a mine-field, setting off the mines to clear the way for a larger, slower ship. The technology GA uses to coat the nuclear reactor fuel pellets is also used for infrared shielding of airplanes to make them radar-invisible. Spinoffs!

LaRouche Youth Movement members (left to right) Ardena Clark, Jason Ross, Sky Shields, Cody Jones, and Nick Walsh at the General Atomics tokamak in San Diego, with guide Peter Petersen of GA.

The High-Temperature Nuclear Reactor

Our next guide, the principal engineer of the energy group, gave us an incredibly thorough idea of the new high-temperature gas-cooled reactors. The Next Generation Nuclear Power (NGNP) program, which is to be a high-temperature reactor, would be capable of burning new fuel, or spent nuclear fuel from our nation's nuclear plants, or even plutonium fuel from decommissioned weapons.

The key efficiencies of the high-temperature reactor are: its electricity-producing efficiency of about 50% (compared to 32% for light water reactors), and its 50% efficiency for creating hydrogen fuel (compared to about 25% for electrolysis via current nuclear plants). The sulfur-iodine technique of breaking apart water to create hydrogen gas requires a heat of 850°C, which a gas-cooled plant can create, but conventional nuclear plants cannot. These new nuclear plants could use fuel 12 times more efficiently than current plants, and could also be used to recycle spent fuel (95% of spent fuel is reusable).

We asked about how the manufacturing could take place for these plants, and found out that we are now unable to make the reactor vessels in the United States—Japan or Korea could make them for us. We could make the fuel factories here in the United States pretty quickly, though, our guide thought.

He was excited about the prospect of retooling auto to launch a U.S. industrial recovery.

We pointed out the collapse of the American educational system, and our work in the LYM as the spearhead of a revival of true scientific method. He concurred: The lack of American ability was reflected in the composition of their intern force—of the 10 graduate students they take on every year, about 7 are foreign nationals! We contrasted this with our working through of all of Kepler's original works, and our research on Gauss and Riemann, among others.

The General Atomics Tokamak

We then headed over to the fusion research center, where our guide excitedly told us about how the GA tokamak (from the Russian for Toroidal Chamber with Magnetic Coil) works. In order to overcome the electrostatic repulsion between the positively charged deuterium nuclei, a temperature above 100,000,000°C is required. Since no material container can take that kind of heat without immediately melting, an immaterial container is used instead—a magnetic field.

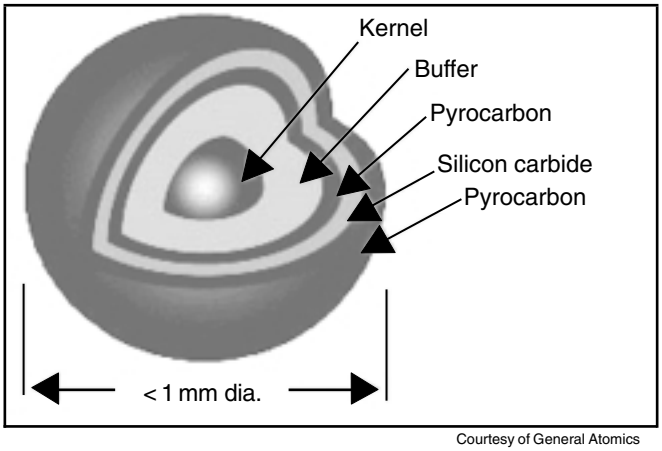
The tokamak is basically a big torus made out of metal, in which a magnetic field is created to contain plasma, which is heated to a temperature of about 250,000,000°C (hotter than the Sun) to create the conditions for fusion to occur. The GA tokamak is able to operate for five-second bursts, holding particles in the field for up to half a second (a huge advance beyond the millisecond times first achieved in such experiments). During the five-second bursts (the copper coils would melt if run longer than that), the tokamak draws 500-600 megawatts, which is provided onsite by a huge fly-wheel that is spun down to provide the power. General Atomics' electric bill is $2,000,000 per year, which sounds huge, but is actually less than that of Sea World.

This is the most flexible tokamak in the world, with the most control over the shape of its magnetic field. It is also the largest privately operated tokamak in the entire world. What's more, it was actually built decades ago! The mission of the tokamak research has three goals: first, to learn how to organize, fine-tune, and control the shape of the plasma to achieve maximum performance. Second, to learn how to use microwave and radiowave energy to achieve this plasma shaping and to efficiently heat the plasma. And third, to learn how to control the plasma exhaust, where the plasma meets the solid materials of the real world.

On our walk out of the building, our guide asked us, "You are young, what do you think about nuclear power?" We told him that we think it's awesome and that our generation is not as brainwashed against progress as the Baby Boomers. He responded well to the scientific and political mission of the LYM. He commented that the wide range of people at GA make it possible to talk to colleagues in many different fields, and that the ability to have cross-discipline discussions made for fruitful work.

We wrapped up with lunch with the energy engineer in the company cafeteria. While discussing LaRouche's political intention and the goals of the LYM, he became excited about retooling, and about bringing the politicians and the scientists into discussion, although throughout the discussion there was an underlying pessimism about the political situation, and about the popular culture's rejection of science. "Politicians all seem to work for big money," he said.

"Well, that's why we need an engaged population to have scientifically sound demands on the politicians." As the leaflet written by the LYM for a Ford plant in Norfolk, Va. said, "They'd secretly love to have their balls back."



Courtesy of General Atomics

This tiny (1 millimeter) fuel particle, designed by General Atomics for the GT-MHR high-temperature reactor, has layers of ceramic coatings surrounding the nuclear fuel at the center. The temperature limit of the coating is higher than the temperature that can be achieved by the fuel particle, so that no fission products can be released. A spinoff of the ceramic coating process is used for infrared shielding of airplanes.

The LYM's Unique Role for Science

General Atomics is an awesome company! All three people we spoke with would be happy to address town meetings. We will keep the discussion going: These people need us! Although they have an admirable quality of excitement (even when designing nuclear plants that have not been built in decades), they need our political success to implement their programs, and they need our ability to reorganize society to create a broad constituency for science among the citizenry.

How free can a creative mind be, with the knowledge that society and politicians have been consistently rejecting a reasonable approach to their work, and without a social political movement to improve their fellow men?

How much of the existentialism in science could be cracked, and what breakthroughs could be made, if fundamental experimentation were funded and new technologies socially implemented? Simultaneously, we must open up the door to the breakthroughs in epistemology needed for true scientific revolutions, and it is uniquely the LYM's work in that direction that is required.