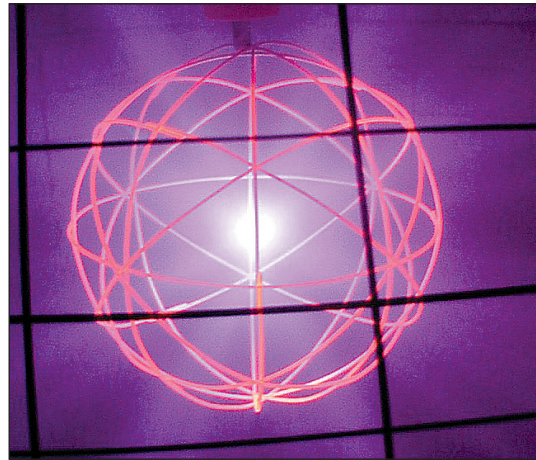
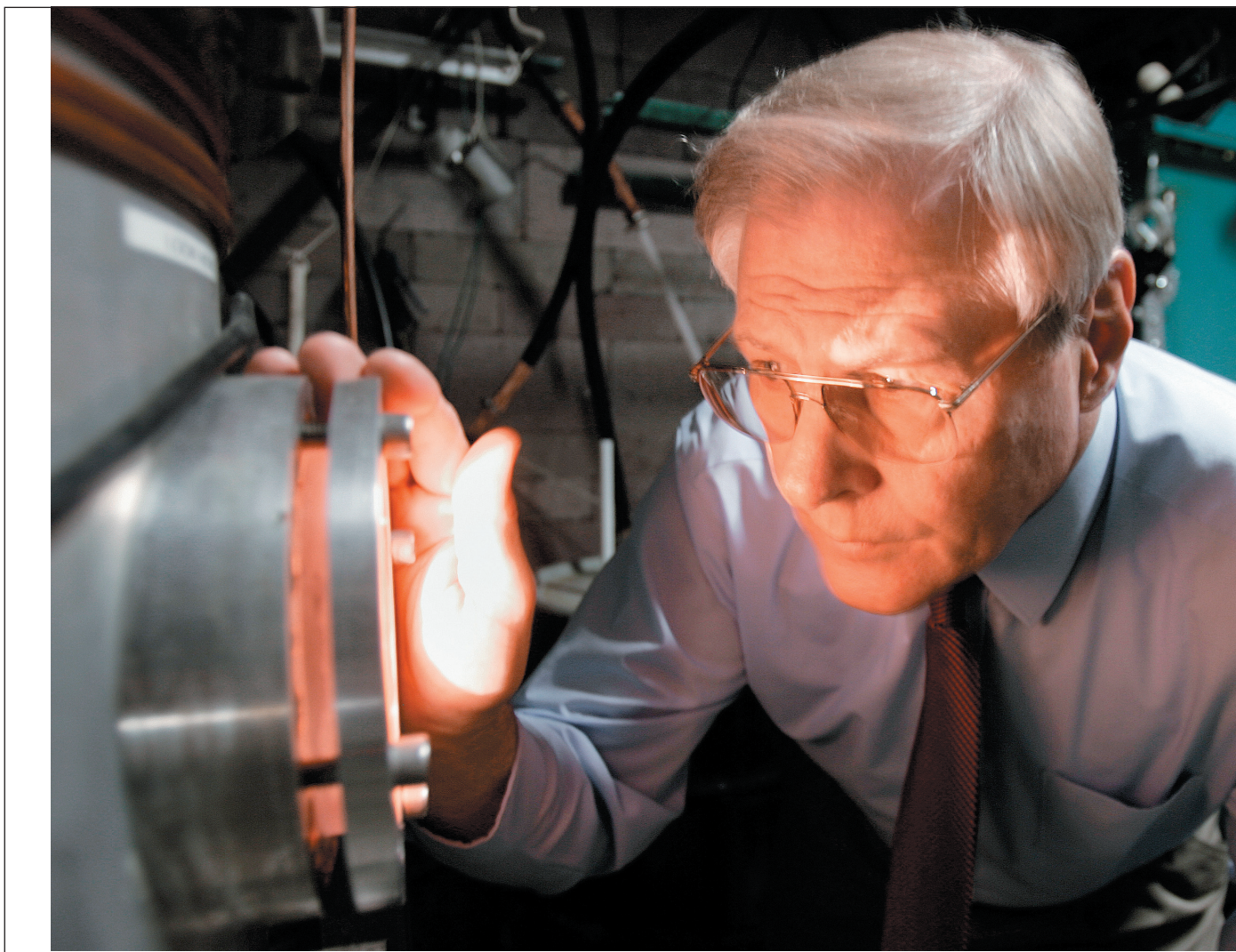


Future in fusion?



UW team involved in controversial 'race' to harness moon's energy



MIKE DeVRIES/THE CAPITAL TIMES

Dr. Gerald Kulcinski, a fusion researcher, works in his lab at UW-Madison. The reaction (top photo) was photographed by the UW-Madison Fusion Technology Institute.

By John Lasker Special to The Capital Times

Twenty-one years ago, a small team of fusion researchers from the University of Wisconsin made a "rediscovery" so potentially momentous it might someday literally shatter the surface of the moon.

It was 1985, the holidays were nearing, and the UW fusion research team was brainstorming: They wondered where they could find large quantities of the isotope helium-3, which is a proven fuel for nuclear fusion.

Just two hundred pounds, they figured, could power a city of a million inhabitants for one year.

Their calculation was based on dozens of incredibly small-scale fusion reactions they had carried out in a basketball-sized fusion device.

"It was around Christmas. That's when we made what I like to call our 'rediscovery,'" said Dr. Gerald Kulcinski, part of the UW team since the beginning and now the director of the Fusion Technology Institute at UW.

Apollo astronauts, they remembered, had found quantities of helium-3 on the moon, Kulcinski said, so they sought out NASA and inquired about their lunar soil samples.

"Apollo records showed that every sample of lunar material had helium-3 in it," he said.

Now, nestled among NASA's 200-point mission goals for lunar base plans it announced earlier this month, there is a proposal to mine the moon for this fuel, even though so

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far there are no viable power plants that exist for it or efficient ways to bring it back to Earth.

Nevertheless, UW fusion researchers believe their plan could get civilization off fossil fuels. That's if crews could return to the moon to mine for helium-3, super-heat it out of the lunar soil to process the gas, and return it to the Earth.

Also, this grand plan would depend on whether large numbers of commercial fusion reactors could be built.

Their theory initially didn't shear off the tops of moon mountains.

But scientists and investors have taken notice. Nearly all of UW fusion research is privately funded. And meanwhile, with China, India, the European Space Agency and at least one Russian corporation all pursuing plans for a manned lunar base in the coming decades, there is increasing talk of a race to control this fuel, one shuttle load of which could theoretically power the United States for a year.

And back on Earth, the UW fusion research inspired someone to become an unparalleled lobbyist, to seek funds from private investors and Washington — someone who has a personal connection with the lunar surface.

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Man on the moon: Apollo 17 astronaut Harris Hagan "Jack" Schmitt shares the distance record for driving a NASA rover across the lunar surface — 22 miles through the Taurus-Littrow valley. He's also a former U.S. senator of New Mexico. But long before being the last human to touch the moon, he was a geologist. And for the better part of the last two decades, the visiting UW professor has tried to persuade powerful people about the potential of helium-3.

He told a Senate committee in 2003 a return to the moon to stay would be comparable "to the movement of our species out of Africa."

The best way to pay for it? Lunar helium-3 and its emerging potential as a fuel for fusion, Schmitt testified.

Schmitt also said that he doesn't have confidence the U.S. government can complete the job. He's calling upon private and corporate investors to make a commitment.



MIKE DeVRIES/THE CAPITAL TIMES

Dr. Jerry Kulcinski (right) a fusion researcher, works in a UW-Madison lab with research associate Sam Zenobia and assistant researcher Bob Ashley (background).

But the nation now determined to gamble on the moon's helium-3 bounty is not the United States, but China.

Among all the nations and private investors interested in the potential of the moon's fuel, it is China that is steadfast on winning what it apparently feels is the helium-3 race — one that could already be far past its starting point.

Ouyang Ziyuan, chief scientist of China's lunar program, has told the international press, "We will provide the most reliable report on helium-3 to mankind," and "Whoever first conquers the moon will benefit first."

China was supposed to launch a lunar satellite this year, but that has been rescheduled for 2007.

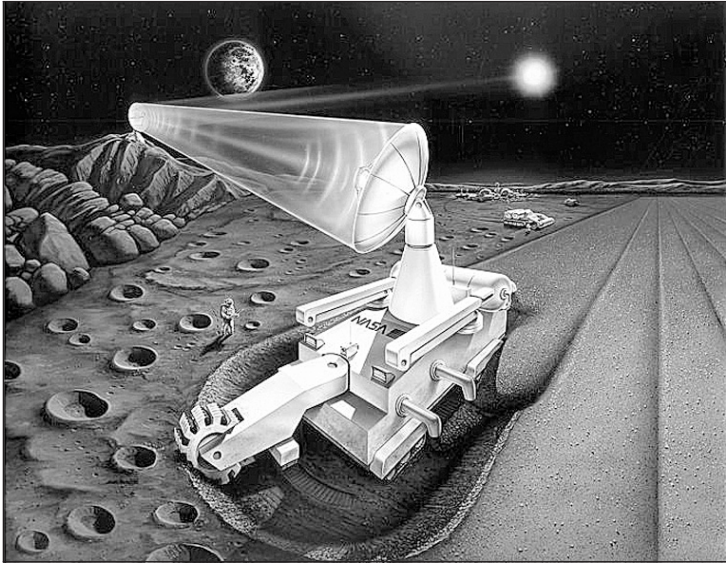
"We would like to know what they're doing, but we don't know," Kulcinski said.

Meanwhile, the U.S. government is generally not interested in the idea.

The Department of Energy is not conducting or funding any helium-3 fusion research, DOE spokesman Jeff Sherwood said.

"There are obvious challenges there," he said of producing energy from the fuel. "It doesn't exist on the Earth."

Instead, the United States and dozens of other nations are spending billions on the construction of a new international tokamak reactor that would help research fusion's first-generation fuel combination: deuterium, which can be extracted from seawater, and tritium. The massive project, dubbed ITER, is to be built in southern France.



SUMMITTED PHOTO

This illustration provided by the UW-Madison Fusion Technology Institute shows how a lunar mining operation for helium-3 might look. Helium-3, a special variant of the element, is abundant on the moon, but almost nonexistent on Earth.

Kulcinski said he and the team are not bitter about ITER's disregard, or the DOE's disinterest. And one bureaucratic giant, he said, finally may be beginning to take some action.

NASA has started preliminary research, or is at least considering it, Kulcinski said.

After recently announcing plans for a lunar base by 2024, NASA also officially stated that a research component of this future moon mission may be the study of lunar helium-3 for "fusion reactors on Earth" to "reduce Earth's reliance on fossil fuels."

Some experts nonetheless are speculating the United States has been secretly re-

searching helium-3 for some time now and has intentions on its monopolization.

Not long after President Bush in 2004 declared that the United States was headed back to the moon, Russian academic Erik Galimov told the Izvestia newspaper that the White

House is deliberately not offering its true lunar intentions.

The Bush administration contends its major rationale for a lunar base is to establish a stepping stone for a mission to Mars.

Galimov told Izvestia that the United States' moon colonization plan would "enable the U.S. to establish its control of the global energy market 20 years from now and put the rest of the world on its knees as hydrocarbons run out."

Speculation on any current White House "hidden agenda" has become an industry in itself. But perhaps Galimov is basing his conjecture on who was recently named to NASA's Advisory Council, its pre-eminent civilian consultative arm, which was restructured last year in the wake of President Bush's calls for a future moon mission.

Leading the council is Schmitt, who was appointed to its chair by Mike Griffin, chief of NASA. Fellow helium-3 advocate Kulcinski is also on the council.

Schmitt declined to comment for this article. But Kulcinski said their lunar helium-3 research is separate from their NASA duties.

"The NAC is purely an advisory council to Dr. Griffin," Kulcinski said. "Our appointments to this advisory committee have nothing to do with our specific research interests."

But Bruce Gagnon, the director of the Global Network Against Weapons and Nuclear Power in Space, said naming Schmitt and Kulcinski to the Advisory Council gives credence to Galimov's theory.

Gagnon said lunar helium-3 overtures by other countries have persuaded Schmitt, Kulcinski, the White House and NASA to take action.

"These guys have been working for years to set this up, and now they are moving quickly because they fear that other countries will get to these resources first," Gagnon said.

Stephen Aftergood, who directs the Washington-based Federation of American Scientists' Project on Government

Secrecy, says those who wish to return to the moon need a rationale. Lunar helium-3 offers an economic one, even if its potential as a terrestrial super fuel is far from proven, he says.

Aftergood doesn't believe a race with China for lunar helium-3 has begun. Yet a race to the moon against China — whether real or superficial — may be in NASA's best interest, he said.

"There are some who wish this would be the case — this race with China. They believe it would recapture the dynamic of the United States' and Russia's race to the moon," he said.

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'Not practical': Fifteen years ago, Kulcinski said that he and the UW fusion research team sought out federal funding for research. They were twice rejected with the same reasoning.

"Each agency didn't think the other could do their job," he said. "The Department of Energy told us, 'We're never going back to the moon. We can't afford to.' NASA told us, they didn't trust us — or anyone else — to make a fusion reactor."

There are those who still have a bleak outlook for any future helium-3 success.

"We just don't have a need for helium-3. It's not practical," said Jim Benson, founder of SpaceDev, which helped build SpaceShipOne's engine and is also a client for the Missile Defense Agency.

Benson said mining for helium-3 on the moon doesn't pass the "net energy analysis" test. In other words, he says that with current technology it would take more energy to retrieve the fuel than the fuel would provide.

But Kulcinski calls Benson's claims "just flat wrong." He cites a doctoral thesis by one of his graduate students, Scott White, that in 1998 calculated that helium-3 would return more energy — even after mining, transportation and the construction of fusion plants are accounted for — than coal, nuclear fission or wind.