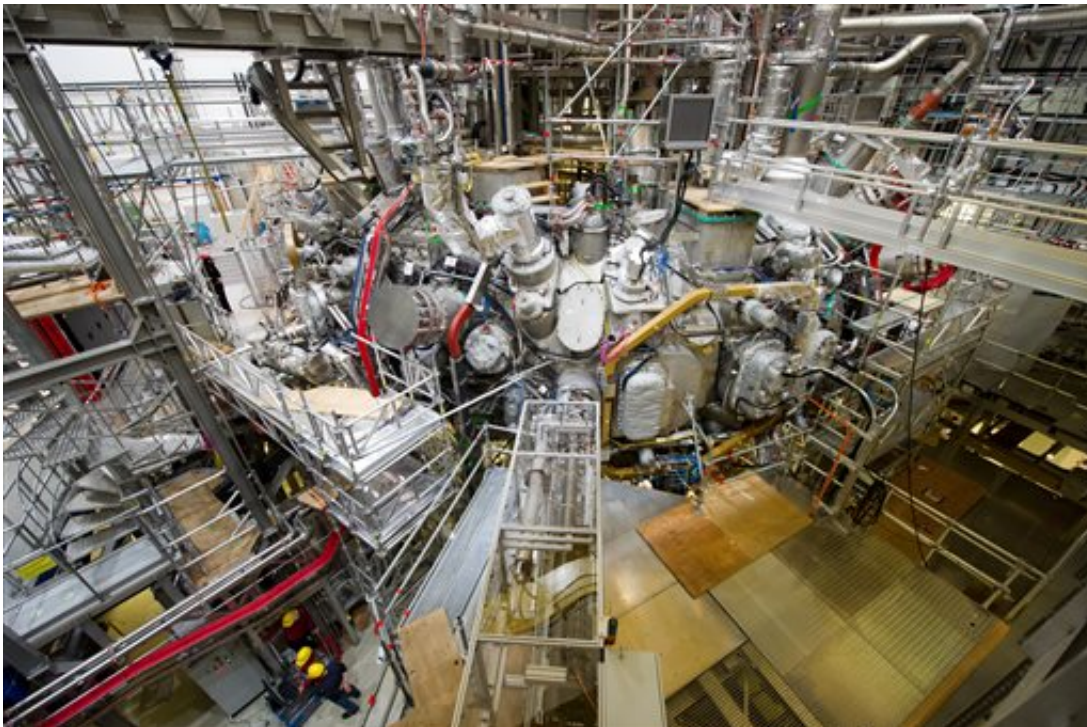


Scientists to inject fuel in experimental fusion device

February 3 2016, by Byfrank Jordans



This Dec. 10, 2015 file photo shows the nuclear fusion research center at the Max Planck Institute for Plasma Physics where the first plasma has been produced at the "Wendelstein 7-X" in Greifswald, Germany. Scientists are poised to flip the switch on an experiment that could take them a step closer to the goal of generating clean and cheap nuclear power. Researchers at the institute plan to inject hydrogen into a doughnut-shaped device to produce a super-hot gas known as plasma. A test on Wednesday, Feb. 3, 2016, will show whether the 400-million-euro (US \$ 435-million) device can handle hydrogen, which would be the fuel in future fusion reactors. (Stefan Sauer/dpa via AP, File)

Scientists in northeast Germany were poised to flip the switch Wednesday on an experiment they hope will advance the quest for nuclear fusion, considered a clean and safe form of nuclear power.

UPDATE: [Scientists in Germany switch on nuclear fusion experiment](#)

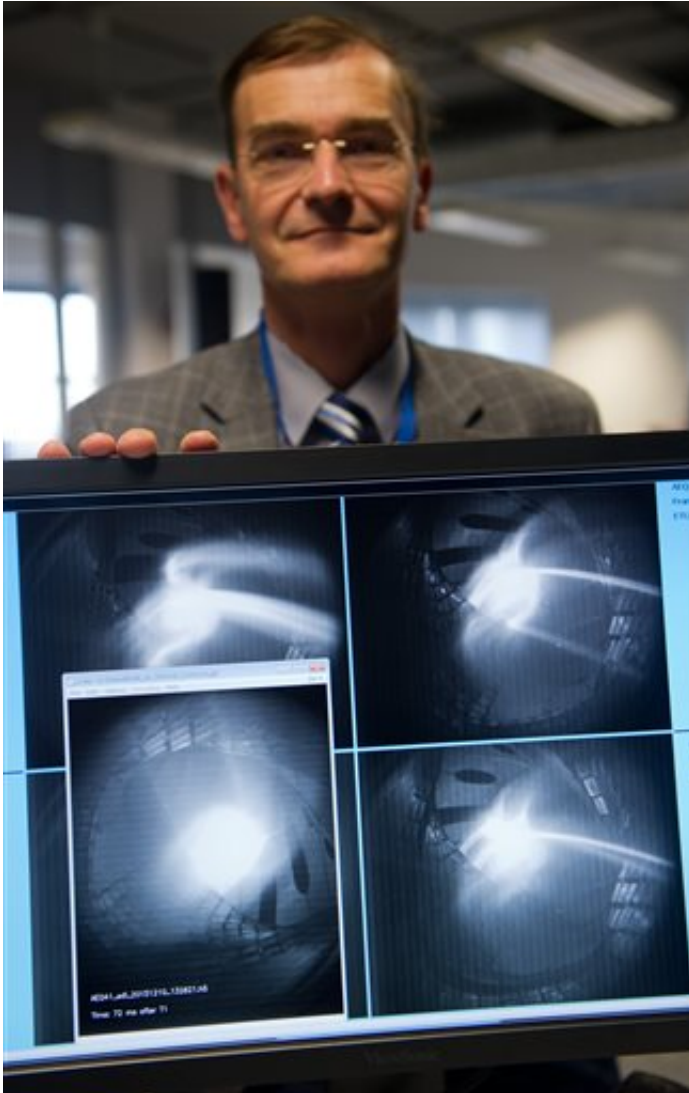
Researchers at the Max Planck Institute in Greifswald planned to inject a tiny amount of hydrogen and heat it until it becomes a super-hot gas known as plasma, mimicking conditions inside the sun.

It's part of a world-wide effort to harness nuclear fusion, a process in which atoms join at extremely high temperatures and release large amounts of energy.

Advocates acknowledge that the technology is probably many decades away, but argue that—once achieved—it could replace fossil fuels and conventional nuclear fission reactors.

Construction has already begun in southern France on ITER, a huge international research reactor that uses a strong electric current to trap plasma inside a doughnut-shaped device long enough for fusion to take place. The device, known as a tokamak, was conceived by Soviet physicists in the 1950s and is considered fairly easy to build, but extremely difficult to operate.

The team in Greifswald, a port city on Germany's Baltic coast, is focused on a rival technology invented by the American physicist Lyman Spitzer in 1950. Called a stellarator, the device has the same doughnut shape as a tokamak but uses a complicated system of magnetic coils instead of a current to achieve the same result.



In this Dec. 10, 2015 file photo technical director Hans-Stephan Bosch holds up computer images showing the first plasma generated at the "Wendelstein 7-X" nuclear fusion research centre at the Max Planck Institute for Plasma Physics in Greifswald, Germany. Scientists are poised to flip the switch on an experiment that could take them a step closer to the goal of generating clean and cheap nuclear power. Researchers at the institute plan to inject hydrogen into a doughnut-shaped device to produce a super-hot gas known as plasma. A test on Wednesday, Feb. 3, 2016, will show whether the 400-million-euro (US \$ 435-million) device can handle hydrogen, which would be the fuel in future fusion reactors. (Stefan Sauer/dpa via AP, File)

The Greifswald device should be able to keep plasma in place for much longer than a tokamak, said Thomas Klinger, who heads the project.

"The stellarator is much calmer," he said in a telephone interview. "It's far harder to build, but easier to operate."

Known as the Wendelstein 7-X stellarator, or W7-X, the 400-million-euro (\$435 million) device was first fired up in December using helium, which is easier to heat. Helium also has the advantage of "cleaning" any minute dirt particles left behind during the construction of the device.

David Anderson, a professor of physics at the University of Wisconsin who isn't involved in the project, said the project in Greifswald looks promising so far.

"The impressive results obtained in the startup of the machine were remarkable," he said in an email. "This is usually a difficult and arduous process. The speed with which W7-X became operational is a testament to the care and quality of the fabrication of the device and makes a very positive statement about the stellarator concept itself. W7-X is a truly remarkable achievement and the worldwide fusion community looks forward to many exciting results."

While critics have said the pursuit of nuclear fusion is an expensive waste of money that could be better spent on other projects, Germany has forged ahead in funding the Greifswald project, costs for which have reached €1.06 billion euros in the past 20 years if staff salaries are included. Chancellor Angela Merkel, who holds a doctorate in physics, is expected to attend Wednesday's event, which takes place in her constituency.

Over the coming years W7-X, which isn't designed to produce any energy itself, will test many of the extreme conditions such devices will

be subjected to if they are ever to generate power, said John Jelonnek, a physicist at the Karlsruhe Institute of Technology, Germany.

Jelonnek's team is responsible for a key component of the device, the massive microwave ovens that will turn hydrogen into plasma, eventually reaching 100 million degrees Celsius (180 million Fahrenheit).

Compared to nuclear fission, which produces huge amounts of radioactive material that will be around for thousands of years, the waste from nuclear fusion would be negligible, he said.

"It's a very clean source of power, the cleanest you could possibly wish for. We're not doing this for us, but for our children and grandchildren."

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