PRESS RELEASE

Science Year 2025 makes fusion energy tangible for schoolchildren

Fraunhofer Institute for Laser Technology ILT in Aachen, together with tinkerbrain – Institut für Bildungsinitiativen GmbH, has developed multimedia and multidisciplinary learning and teaching materials as part of Science Year 2025, funded by the Federal Ministry of Research, Technology, and Space (BMFTR). It teaches schoolchildren about the scientific and technical background of fusion as an energy source of the future and its potential to generate a secure climate-neutral energy supply. Three schools in Aachen have already worked with this subject in regular lessons and in week-long project seminars. The project partners are now making it available free of charge to interested schools and extracurricular learning centers as the web-based "fusionsLAB.de."

There would be no life on Earth, no photosynthesis, and no fossil or renewable energies without the fusion that has been going on in the sun for 4.6 billion years. Researchers around the world are working to make this energy source usable on Earth. The German government is providing over two billion euros in research funding for the current Fusion Action Plan by 2029 alone. The goal is to build a fusion power plant in Germany.

In Science Year 2025, students and teachers from three schools in Aachen set out to explore fusion as the energy of the future. To this end, Fraunhofer ILT and tinkerbrain – Institut für Bildungsinitiativen have designed and developed web-based learning and teaching materials that introduce students to this complex subject matter through experiments, lectures, videos, and interactive learning modules.

As part of Science Year 2025, the BMFTR has provided €100,000 in funding for the "Future Energy Fusion Project – ProZeF." After initial testing in a pilot project week at Städtische Gesamtschule (Municipal Comprehensive School) Aachen Brand, the project partners optimized the participatory, multimedia, and multidisciplinary learning and teaching materials in close consultation with physics teachers and STEM coordinators at the Couven Gymnasium and Kaiser-Karls Gymnasium. Both Aachen high schools have used the material in regular lessons. As a network partner, the education office of the Aachen city region established contact with the schools. "Other schools and extracurricular learning centers in the region and beyond would like to use the material in the future," reports education designer and tinkerbrain managing director Anke M. Leitzgen.

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Raising awareness for a secure, climate-neutral energy supply

The modular learning and teaching material initially raises awareness among students from the 8th grade onwards of how closely economic development, prosperity, and a secure energy supply are linked. It also shows how fusion in the sun underpins both the formation of fossil fuels and today's renewable energy sources: The sun drives wind systems, water cycles, and plant growth and feeds solar thermal energy and photovoltaics. Over the last 200 years, stored, on-demand fossil fuels have played a central role in ensuring a stable energy supply—yet this stability has come at the cost of climate change. The learning material introduces basic physical principles, key terms, and units of measurement used in modern energy systems and highlights issues of global energy and climate justice. It also focuses on economic aspects such as the relationship between primary energy consumption and gross national product. With the materials and guided by key questions, students can explore these topics independently in teams.

As an introduction to fusion, the material examines how solar energy—and thus fusion in the sun—is already used indirectly on Earth. These applications range from passive houses and greenhouses to solar cookers, hydropower, wind and solar power, biomass, and even cold-blooded animals. Participants can familiarize themselves with how diverse these approaches are through videos, web content, and technical articles. As in all modules, they present the results of their research to each other. They are free to choose whether to produce videos, podcasts, posters, or presentations. "They should apply what they have learned right away and start talking with the other participants about it," explains Peter Trechow, project manager at Fraunhofer ILT. The project is not just about imparting knowledge, but also about giving young people a positive outlook on the future and encouraging them in times of climate change and multiple global crises. Leitzgen adds: "Those who engage in conversation and experience that their own voice counts will also have the confidence to become part of the solution, perhaps even professionally."

Fusion can decouple energy supply from the carbon cycle

This is where the actual heart of the "fusionsLAB" comes into play: a module that not only combines technical fascination with the physical fundamentals of fusion technology, but also makes the fusion of the hydrogen isotopes deuterium and tritium comprehensible. Starting at the atomic level and with the basics of laser technology, students learn about power plant concepts for laser-based inertial fusion and magnetic fusion. They explore Albert Einstein's general theory of relativity as well as the technological challenges involved in developing a fusion power plant. Hands-on experiments make the fusion reaction – and its complexity – tangible. In six subject areas, students deepen their knowledge according to their interests – ranging from

physical and technical topics to broader questions of global justice, modern energy systems, social acceptance, and economic factors. "Here, too, we focus on applying and consolidating the knowledge learned," says Leitzgen. At the end, there is a simulation game: The youth slip into roles—as concerned citizens, power plant planners, scientists, financial experts, or media professionals—and present their position on fusion. "This shows what has stuck," explains Trechow. "Is fusion a beacon of hope or a distraction? A billion-dollar white elephant or the key to global justice?" With the material developed in Science Year 2025, "ProZeF" is directly helping young people find technically sound answers to these questions.

The aim now is to make the learning and teaching materials available to as many schools and extracurricular learning centers in Germany as possible. The modular and self-explanatory materials can be used in regular lessons or in week-long projects for students from the 8th grade onwards. Interested parties are invited to contact the project managers to obtain access data and further information about the free materials.

Here's what the teachers involved have to say:

"Young people want to feel needed. Finding a niche, being part of a development—that's extremely important to them. And that's exactly what this project enables."
Dominik Scheen, physics teacher and STEM coordinator at Städtische Gesamtschule Aachen Brand

"Many young people are not particularly optimistic about the future. This makes it all the more important to show them technologies that give them hope – such as nuclear fusion. The materials provided by Fraunhofer ILT make a great contribution to this!"
Andreas Kral, physics teacher and STEM coordinator at Kaiser-Karls-Gymnasium, Aachen

"The fusionsLAB shows students that nuclear fusion is bringing an environmentally friendly energy source within reach – and makes the current state of research tangible. Precisely because young people are so interested in these topics of the future, I am happy to recommend it."
Wolfgang Heinen, physics teacher and STEM coordinator at Couven-Gymnasium, Aachen

Further information:

Science Year 2025 – Future Energy: www.wissenschaftsjahr.de/2025
Teaching and learning platform "fusionsLAB": www.fusionslab.de
(All texts in German)



Image 1:
Pilot project week at the Städtische Gesamtschule Aachen Brand. From July 1 to 3, 2025, students explored the future energy of fusion.
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Image 2:
Students prepare a podcast on the topic of fusion as the energy of the future.
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Image 3:
During the pilot week, the students worked in different teams on tasks related to the topic of energy.
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Image 4:
"The fusionsLAB shows students that nuclear fusion is bringing an environmentally friendly energy source within reach – and makes the current state of research tangible. Precisely because young people are so interested in topics that shape their future, I am happy to recommend it," says Wolfgang Heinen, physics teacher and STEM coordinator at Couven Gymnasium, Aachen.
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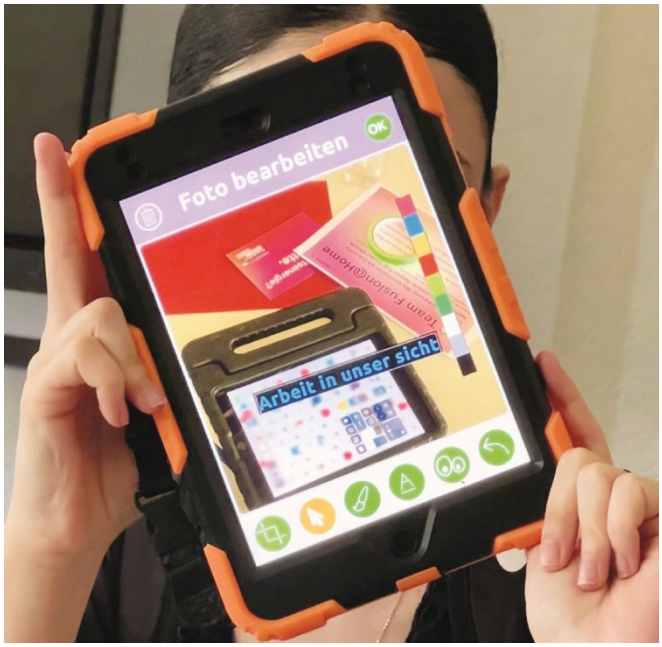

Image 5:
Anke Leitzgen, tinkerbrain: "Other schools and extracurricular learning centers in the region and beyond would like to use the modular learning and teaching materials in the future."
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