

Spallation Neutron Source

Accelerating science

What is the Spallation Neutron Source (SNS) at Oak Ridge National Laboratory (ORNL)?

ORNL hosts two of the world's most powerful sources of neutrons for research that help us better understand materials that affect our daily lives: the SNS and the High Flux Isotope Reactor (HFIR), which produce beams of neutrons by two different processes.

The SNS is an accelerator-based facility with the world's most powerful spallation source, providing intense neutron beams for scientific research and industrial development.

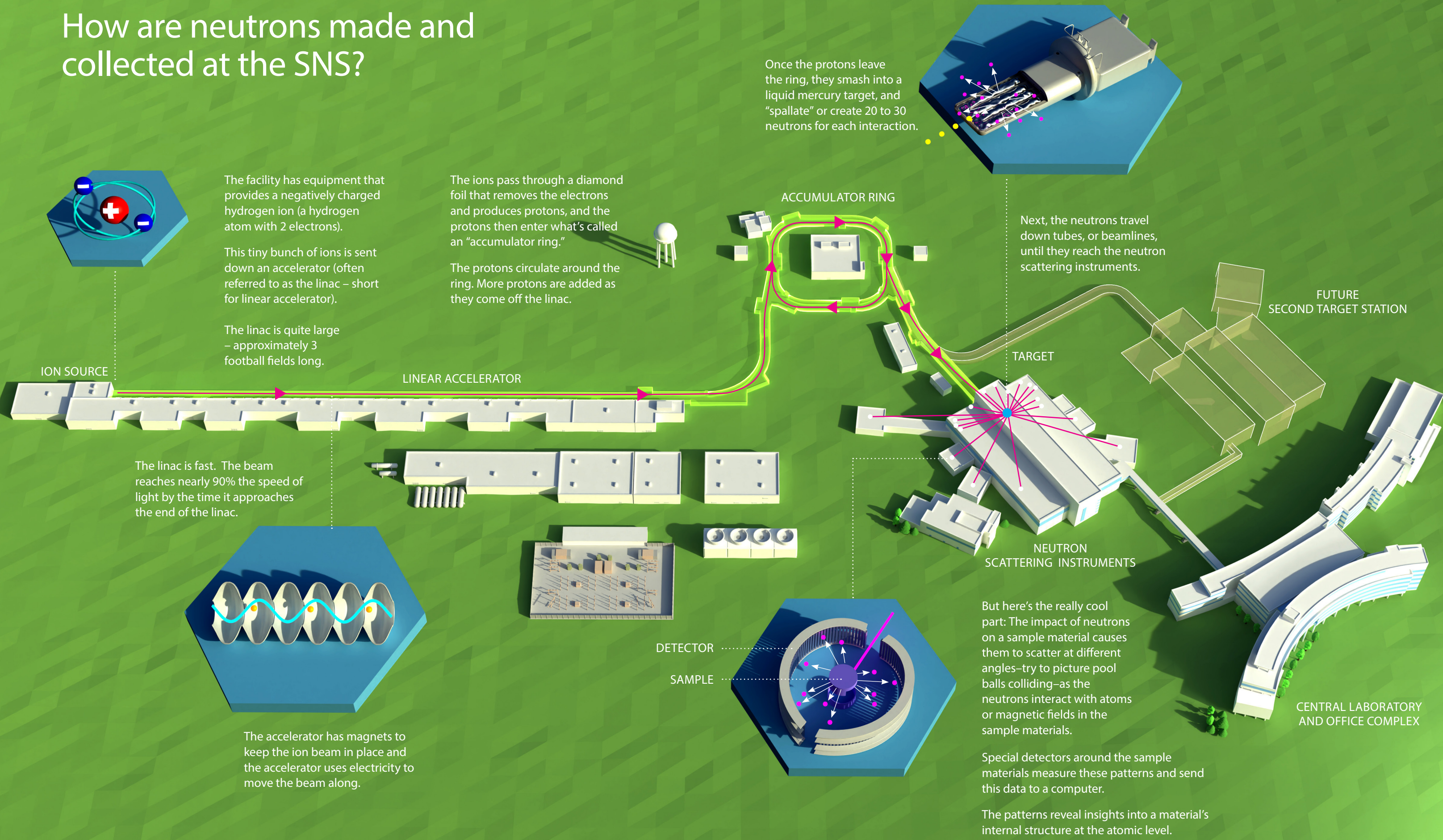
SNS delivers short pulses of protons—60 times a second—to a target system where neutrons are produced through a process called spallation.



Why neutrons?

Because neutrons have no electrical charge, they can easily pass through a sample of material without harming it, revealing information about the material's structure and properties.

How are neutrons made and collected at the SNS?



Neutron research

Neutron scattering is used to make new scientific discoveries and to provide a more fundamental understanding of materials. It's used in many applied areas of research, including industry—automotive, aerospace, steel, defense, industrial materials, energy storage, data storage, and biomedicine—to address many of the major scientific challenges of the 21st century.

Neutron research helps improve:

- batteries and electronic devices
- alternative energy sources, such as solar cells
- transportation materials such as bridge cables, engine parts
- drugs and biologics
- biofuels
- polymers
- computing technologies
- airport security systems and more

User program

Each year the User Office issues two calls for research proposals. Submissions are peer-reviewed by external panels, with recommendations based on scientific and technological impact. Experiments are also reviewed for feasibility and safety, and the experience of the research team. Those with the highest potential for scientific impact are approved and scheduled for instrument access.



The future: The Second Target Station (STS)

The Proton Power Upgrade (PPU) project at the SNS has increased the neutron flux, or number of neutrons produced, and significantly increased capacity to support the national and international research community. The PPU has also set up the SNS to support a Second Target Station (STS), which will be a third neutron source at ORNL. The STS will complement capabilities at the SNS First Target Station (FTS) and HFIR by providing new, transformative capabilities for materials research and will maintain US competitiveness in materials development as new European and Asian neutron facilities come online. With a new suite of world-leading instruments boasting the latest advances in high-resolution optics, instrument design and more, the STS will make it possible to conduct a wide range of experiments now not possible anywhere in the world.

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