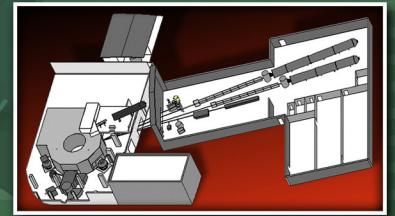


INSTRUMENT

BEAM LINE

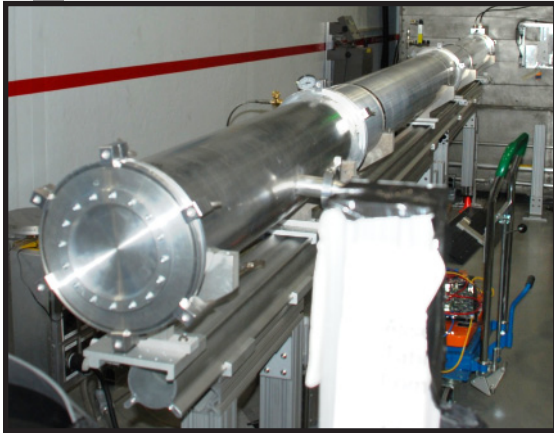
CG-1D

HIGH FLUX ISOTOPE REACTOR



NEUTRON IMAGING PROTOTYPE FACILITY

The CG-1D beam is used for neutron imaging measurements and can be configured for white beam operation or can produce a pulsed beam when operating with a chopper. Apertures (with different diameters D (pinhole geometry) are used at the entrance of the helium-filled flight path to allow L/D variation from 400 to 800. L is the distance between the aperture and the detector (where the image is produced). Samples sit on a translation/rotation stage for alignment and tomography purposes. Detectors for CG-1D include charge-coupled device (CCD) cameras.



Helium-filled aluminum flight tubes.

A micro-channel plate detector with a 40 micron spatial resolution is available upon request for time-of-flight neutron imaging experiments. $^6\text{LiF}/\text{ZnS}$ scintillators varying from 50 to 200 microns are available. Work on neutron imaging specifically supports the development of the future VENUS instrument at SNS, which will be dedicated to neutron imaging with an emphasis on Bragg-edge contrast imaging.

SPECIFICATIONS

Wavelength	$1.8 < \lambda < 6 \text{ \AA}$
Wavelength resolution	$\Delta\lambda/\lambda \sim 10\%$
Highest spatial resolution	50 microns (FOV: $4 \times 4 \text{ cm}^2$) and 100 microns (FOV: $6 \times 6 \text{ cm}^2$)
Sample-to-detector distance	5 m
Detector	CCDs
Detector chip size	2048×2048 pixels
Detector resolution	5.2×5.2 (FOV: $4 \times 4 \text{ cm}^2$) and 13.4×13.4 (FOV: $6 \times 6 \text{ cm}^2$) microns ² pixels
Detector frame rate	1 fps (1 to 5 min required per image)

Status: Available to users

APPLICATIONS

Energy Storage

- Ion transport in energy storage materials; three-dimensional mapping of ions in electrodes

Technologies

- Particulate deposition in vehicle parts; two-phase transport in heat pipes; multi-phase constrained jet flows; metal casting; reservoir flow, creation, and production

Plant Systems Biology

- Partitioning, transport, and fate of carbon fixed by plants; carbon biosequestration; modeling impacts of rising CO_2 levels; modified bioenergy feedstock plants; cavitation and gas embolism in plants

Plant-Soil-Groundwater Systems

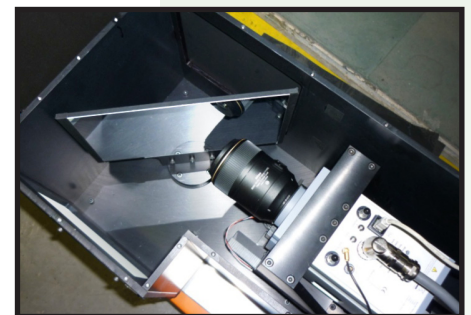
- Transport and interactions of fluids in porous media, water infiltration and aquifer recharge, plant-plant and plant-fungal interactions, change in pore structure and voids after repeated thawing and freezing of permafrost soil

Biological and Forensic Studies

- Structural, contrast agent, and cancer research

Food Science and Archeology

- Water migration and degradation through time



Detector housing for the CCD camera lens, mirror, and scintillator.

FOR MORE INFORMATION, CONTACT

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neutrons.ornl.gov/instruments/HFIR/factsheets/Instrument-cg1d.pdf

