

# Neutrino Science Opportunities at the High Flux Isotope Reactor

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Physics Division

2024 Magnificent CEvNS Workshop  
Valencia Spain

June 12, 2024

ORNL is managed by UT-Battelle, LLC for the US Department of Energy

**6th Magnificent CEvNS Workshop**  
Focusing on the process of coherent elastic neutrino-nucleus scattering (CEvNS)

**International Advisory Committee**  
Philip Barbeau  
Matthew Green  
Janina Hokenmüller  
Diane Markoff  
Grayson Rich  
Kate Schalberg  
Raimund Strauss  
Louis Strigari  
Victoria Wagner

**THE MAGNIFICENT CEvNS**

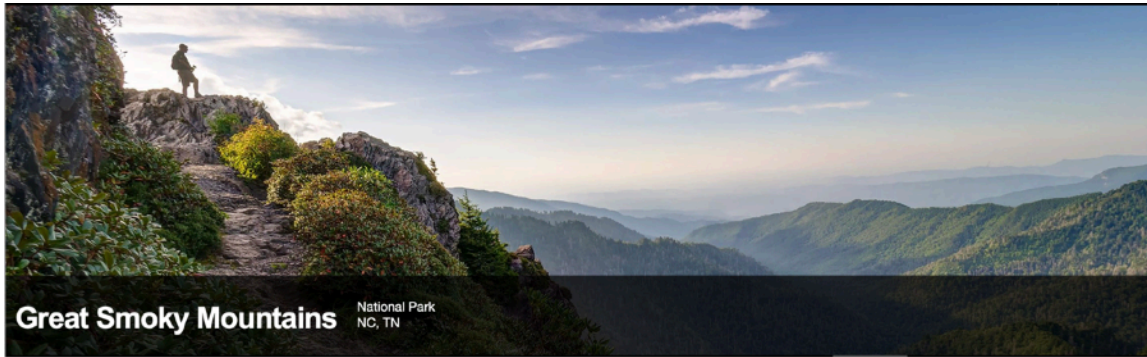
Valencia, 12-14 June 2024  
ADEIT - University-Enterprise Foundation of the University of Valencia

**Local Organizing Committee**  
Diego Aristizabal (UTFSM, Chile)  
Valentina De Romeri (IFIC, CSIC/UV)  
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**Logos:** U.E. FUNDACIÓ UNIVERSITAT I EMPRESA, IFIC INSTITUT DE FÍSICA, CSIC UNIVERSITAT DE VALÈNCIA, GENERALITAT VALENCIANA, Gen-T, U.S. DEPARTMENT OF ENERGY, U.S. DEPARTMENT OF ENERGY ENERGY

<https://indico.cern.ch/event/1342813>

# East Tennessee is a nice place to live ... and do science!



Home to the most visited National Park in the U.S.



A history of technological innovation.



Watch college football with 100k of closest friends.



Big Ears Music festival



Knoxville's Urban Wilderness

In 1920, Tennessee cast the ratifying vote to give women in the US the constitutional right to vote. ([A story best told by Dolly Parton ...](#))

# Oak Ridge National Laboratory hosts world-class user facilities

Spallation Neutron Source  
Chestnut Ridge

Oak Ridge Leadership  
Computing Facility

High Flux Isotope Reactor  
Melton Valley

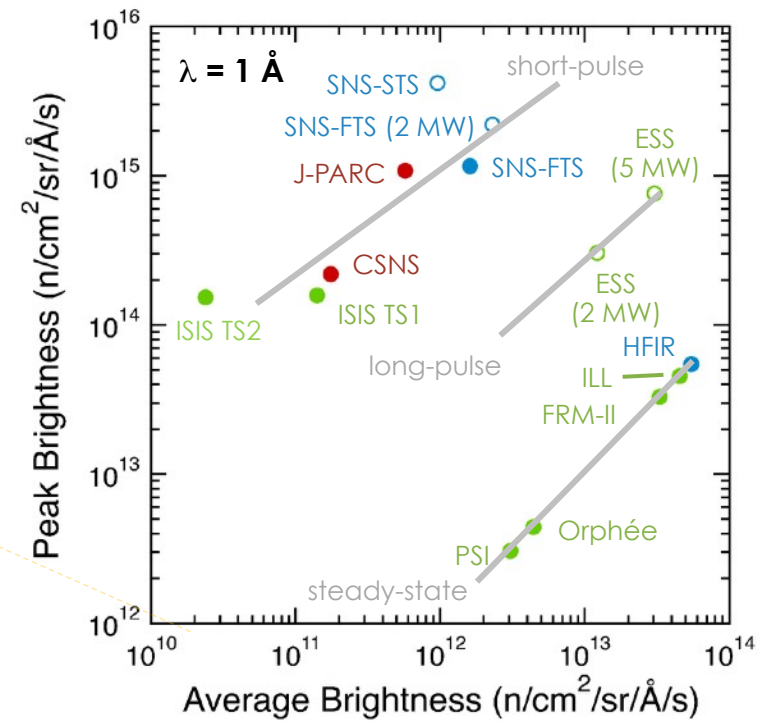
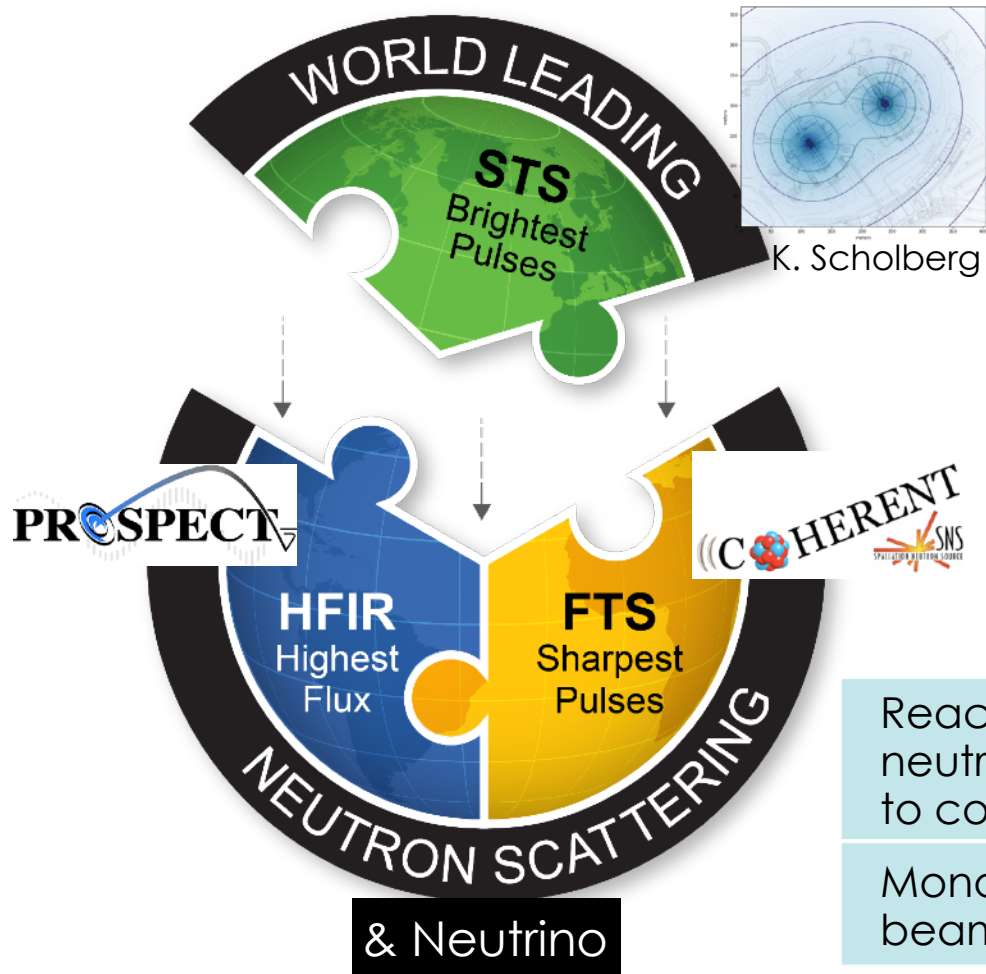
## Additional Centers

- Ultra Trace Forensic Science Center
- Center for Nanophase Material Sciences
- Stable Isotope Production and Research Center
- Building Technologies Research and Integration Center
- Carbon Fiber Technology Facility
- Center for Structural Molecular Biology
- Manufacturing Demonstration Facility
- National Transportation Research Center



Exascale computing since 2022

# 3-Source Strategy for Neutron (and Neutrino) Sciences



- USA
- Asia
- Europe
- Existing
- Planned

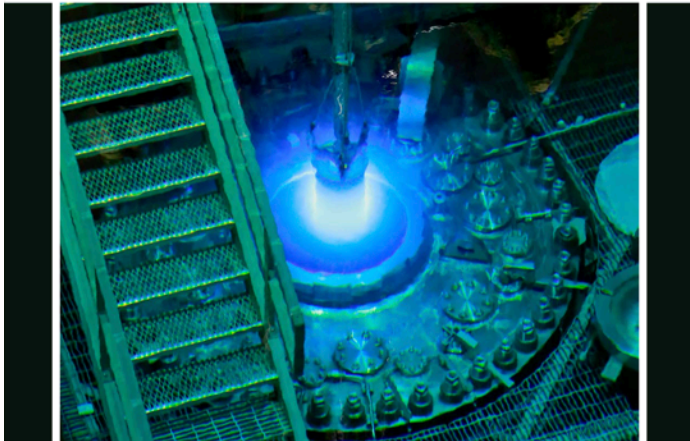
HFIR	SNS FTS	SNS STS
Reactor high flux neutrino source close to core	Highest peak brightness	Highest peak brightness
Monochromatic beams	Pure neutrino beams	Pure neutrino beam with different baseline
	Only facility for CEVNS	"Near-Far" design possible

3 unique facilities with remarkable capabilities

# U.S. Priority to broaden the scientific impact of its user facilities across scientific disciplines.

## *The Scientific Justification for a*

U.S. Domestic High-Performance  
Reactor-Based Research Facility



REPORT OF THE BASIC ENERGY SCIENCES ADVISORY COMMITTEE



The Workshop on Neutrino Science Opportunities  
at the High Flux Isotope Reactor

April 22 - 24, 2024, Oak Ridge National Laboratory

“Dedicated laboratory space for neutrino experiments, detector R&D, and fundamental physics at a reactor or spallation source are at a critical shortage and represent the most urgent needs to advance the field. **A dedicated fundamental physics laboratory at an upgraded HFIR** or a new reactor could have a transformative impact on the field of fundamental physics and the synergistic and collaborative effort of scientists within the Office of Science.”

HFIR Upgrades planned to ensure operation through the turn of the century.

**That's a lot of time for neutrino experiments ... could be yours!**