

Nanoscience, Neutrons and More: User Facilities for Chemistry at ORNL

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Why do chemistry at a major user facility?

- Expert staff assistance and interactions
- Unique instrumentation
- Full suite of synthesis capabilities
- Spectroscopic, thermal, structural, reactivity characterization
- Theoretical interactions and support
- Local access to additional capabilities
 - Neutron scattering (ORNL, ANL, SNL/LANL)
 - Synchrotron X-ray scattering (BNL, ANL, LBNL)

User Facilities at ORNL

Bioprocessing Research Facility
Buildings Technology Center
Californium User Facility for Neutron Science
Computational Center for Industrial Innovation
Cooling, Heating and Power Integration Laboratory
Fuels, Engines, and Emissions Research Center
High Flux Isotope Reactor
High Temperature Materials Laboratory
Holifield Radioactive Ion Beam Facility
Metals-Processing Laboratory Users Facility
Mouse Genetics Research Facility
National Transportation Research Center
Oak Ridge National Environmental Research Park
Oak Ridge Electron Linear Accelerator
Physical Properties Research Facility
Power Electronics and Electric Machinery Research Facility
Shared Research Equipment Collaborative Research Center
Center for Nanophase Materials Sciences (www.cnms.ornl.gov)
Center for Structural Molecular Biology (www.ornl.gov/sci/csd/pdfs/CSMB_Leaflet.pdf)
Spallation Neutron Source (www.sns.gov)



Prof. Z.L Wang (Georgia Tech) with ORNL 300 keV STEM instrument.

Center for Nanophase Materials Sciences (CNMS)



Open access through peer-reviewed proposals

No cost to “open literature” research programs

Destination and gateway (scattering, computation)

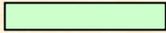
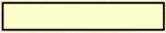
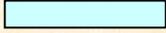


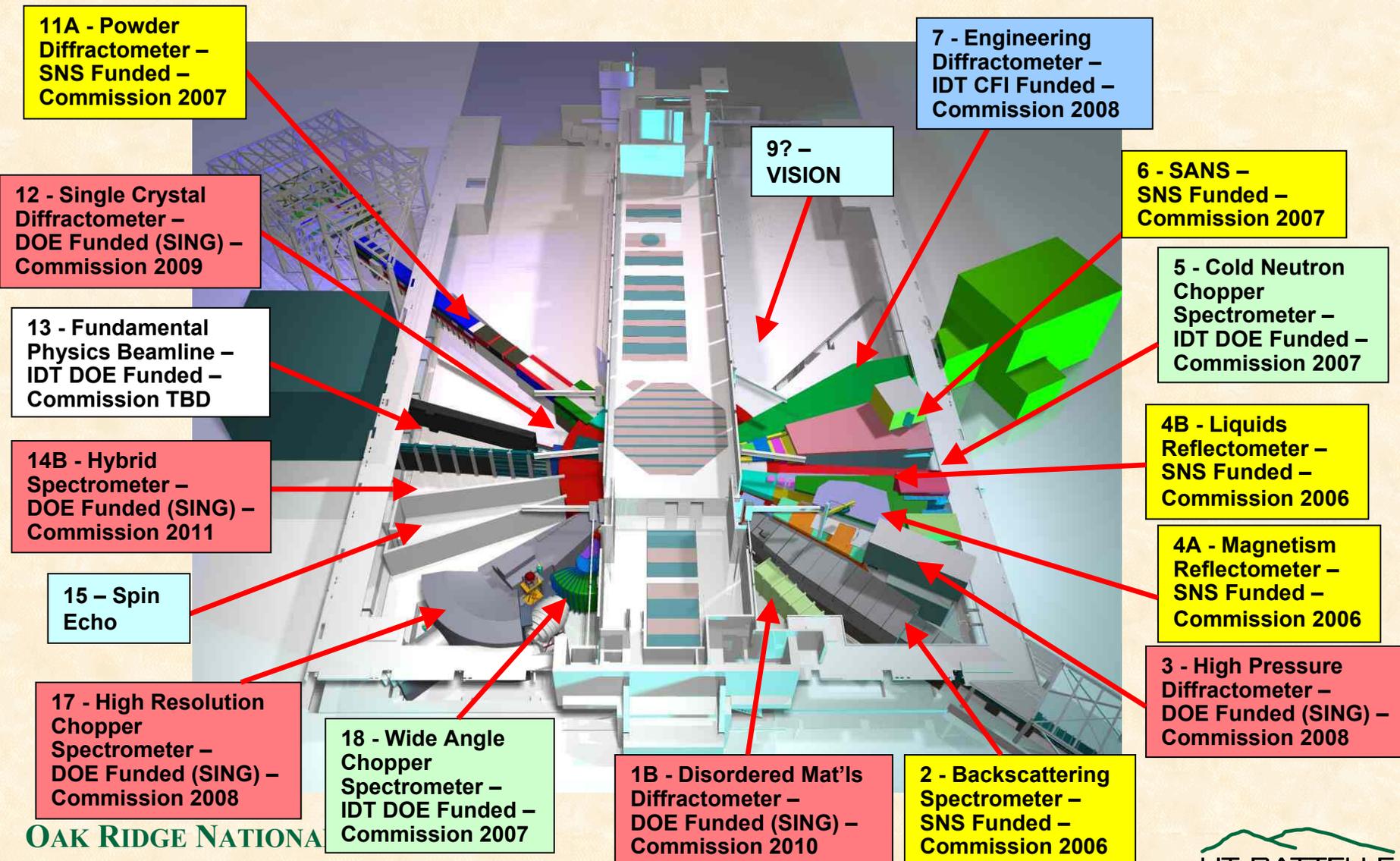
The Spallation Neutron Source



- The SNS will begin operation in 2006 in Oak Ridge, Tennessee
- At 1.4 MW it will be ~8x ISIS, the world's leading pulsed spallation source
- The peak thermal neutron flux will be ~20-100x ILL
- Initial facility will have 1 target station with 24 instruments
- An upgrade to 3-4 MW and a second target station is planned
- SNS will be a short drive from HFIR, a reactor source with a flux comparable to the ILL

SNS Instrument Layout

SNS		SING	
UNIV		NUC-PH	
CANADA		Other	

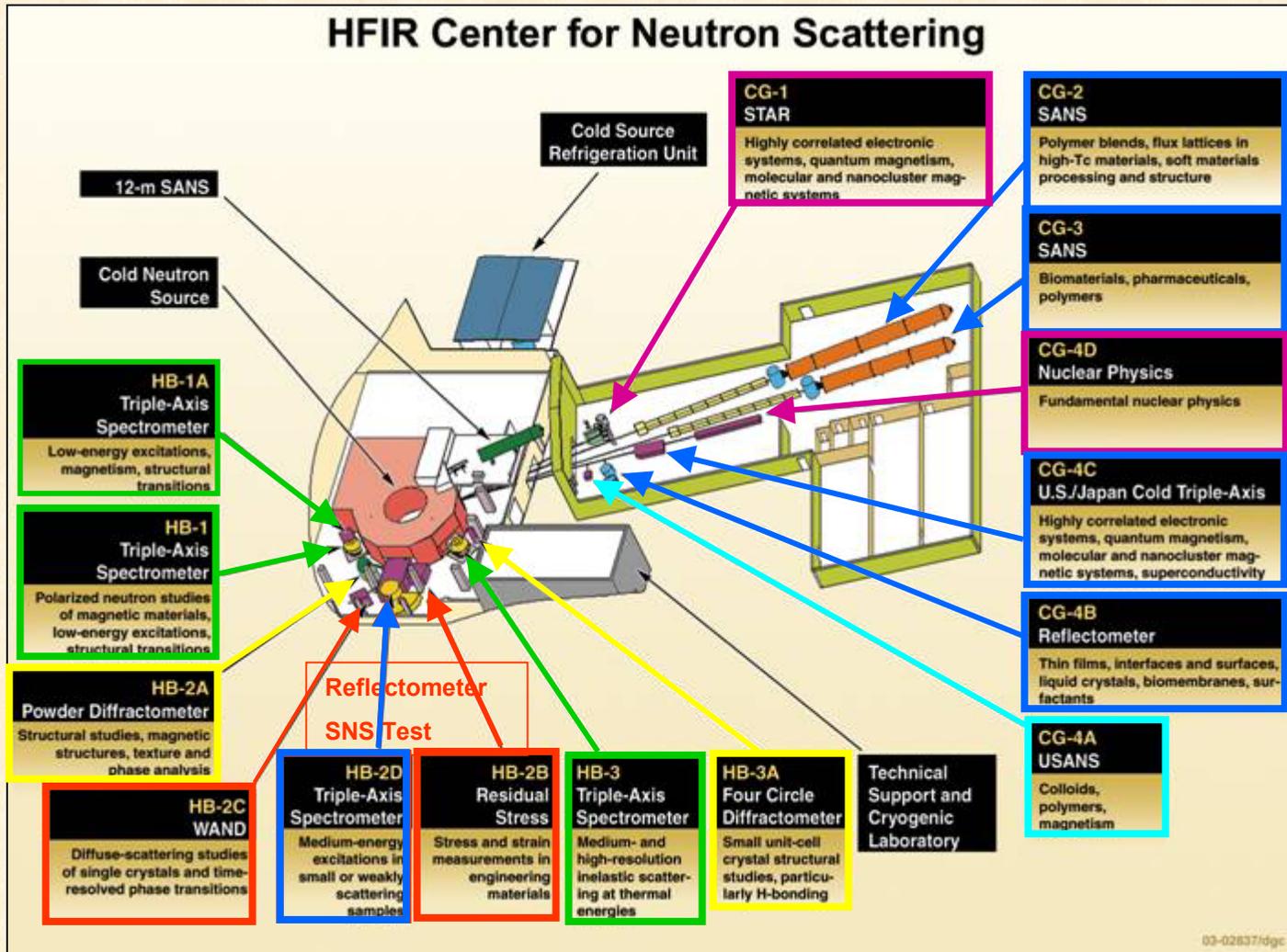


HFIR – The ‘other’ \$1B ORNL neutron source

- Will have best in class facilities for biology and macromolecular science (two cold-source SANS)
- On-site sample handling/preparation capability
- Broad suite of updated thermal instruments

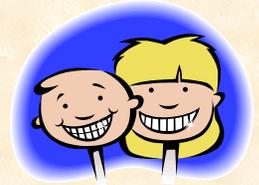


HFIR Instrument Installation Schedule



Characteristics of Friendly Users

- **PATIENT** – Intermittent performance of Instrument/Target/Accelerator
- **ENGAGED** – Interested in participating in debugging instruments/software
- **MOTIVATED** – Getting the data may take more effort than usual
- **LOW MAINTENANCE SAMPLES** – may need to stay in beam for extended periods of time, limited sample environment equipment in 2006



EXCITING SCIENCE

User Facility Opportunities

Access to leading-edge instrumentation and expertise

Broad collaborative opportunities

Coordinated access to multiple facilities

Nanoscience centers for synthesis and characterization

Beam facilities for X-ray and neutron characterization

Major computational capabilities for modeling and simulation

Accessible facilities supporting forefront science