

## SNS Neutron Scattering Instrument Status – June 2001

The SNS Instrument Systems group has developed or is developing concepts for twelve different neutron scattering instruments.

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- Ten instruments have been recommended by the Experimental Facilities Advisory Committee (EFAC) or by its predecessor the Instrument Oversight Committee (IOC)
- Five will be funded within the project
  - High-resolution backscattering spectrometer (beam line 2)
  - Magnetism (vertical surface) reflectometer (beam line 4a)
  - Liquids (horizontal surface) reflectometer (beam line 4b)
  - Extended Q-range small-angle diffractometer (beam line 6)
  - Powder diffractometer (beam line 11a)
- Likely sources of external funding for two more instruments have been identified by Instrument Development Teams (IDTs)
  - High resolution Fermi chopper spectrometer (beam line 17)
  - Multi-chopper inelastic spectrometer with 10-100 microvolt resolution (beam line 5)
- Funding not yet identified for three remaining recommended instruments
  - Engineering materials diffractometer (beam line 9 - tentative)
  - High pressure diffractometer (beam line 1a - tentative)
  - Disordered materials diffractometer (beam line 10 - tentative)
- Concepts are under development for two additional instruments – funding not yet identified
  - Wide-angle Fermi chopper spectrometer (beam line 18 – tentative)
  - Single crystal diffractometer (beam line 12 – tentative)

Data sheets for each of these twelve instruments are attached. Each data sheet shows a sketch of the instrument, a few of the instrument physical parameters, and information about the anticipated instrument performance. Each data sheet also shows a representative list of the types of science that would be addressed with such an instrument.

In order to better show how this suite of instruments fits together to span the range of science, a plot of the momentum-energy ( $Q$ - $\omega$ ) space covered by the inelastic instruments is also provided, as is a plot of the range of  $Q$  and  $Q$  resolution provided by each of the elastic scattering instruments.

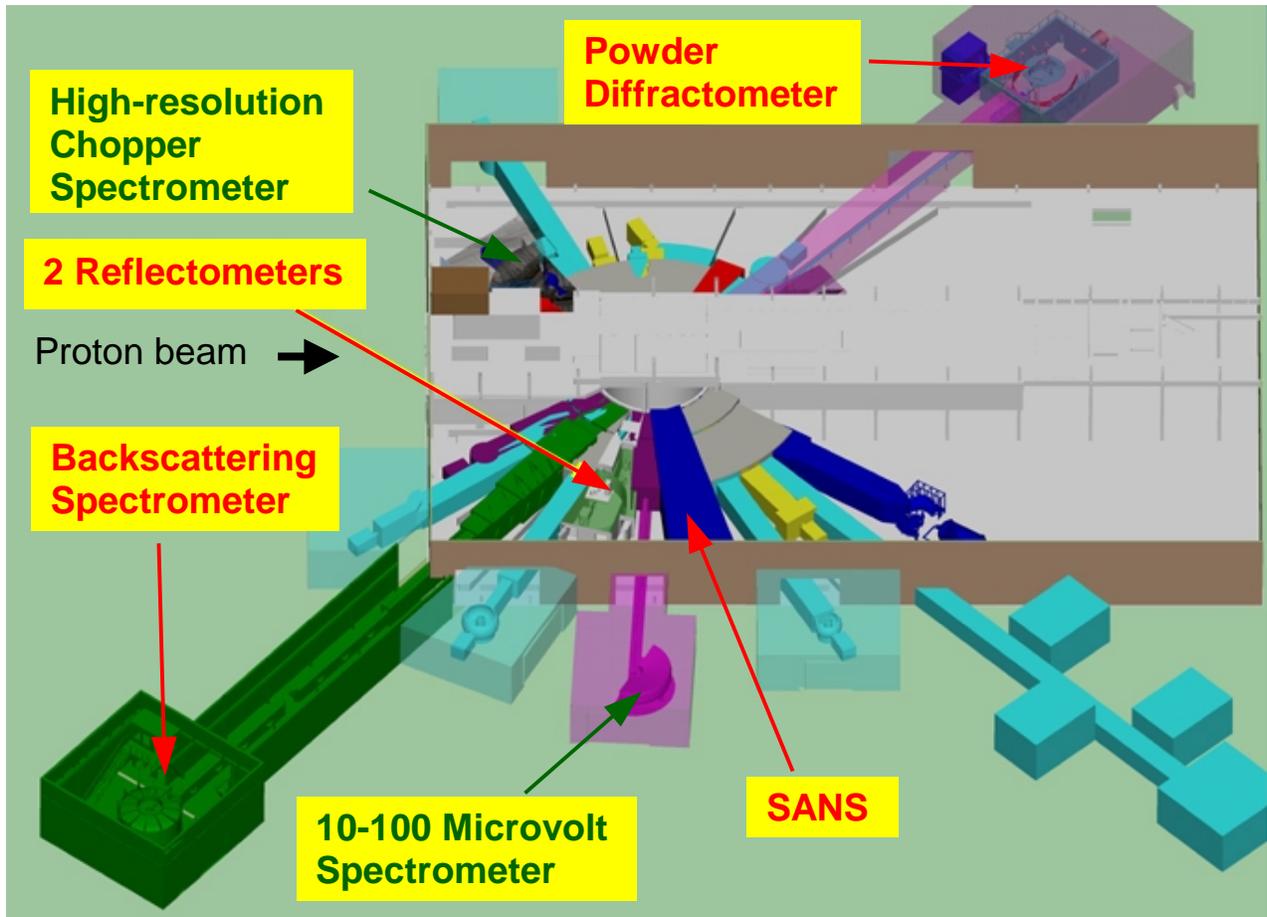
*Note: These data sheets and supplementary material are currently in draft form only, and are subject to change!*

## **Additional interest in instruments is starting to grow**

A number of outside groups have recently submitted Letters of Intent and/or made presentations before the Scientific Advisory Committee or the Experimental Facilities Advisory Committee. Each of these groups has proposed different uses of some of the remaining initially-uninstrumented SNS neutron beam lines. These different uses would be to cover areas of science for which no instrument is currently under study by the SNS. None of these groups has yet progressed to the point of presenting a detailed proposal for such beam line usage, but several of them are expected to do so.

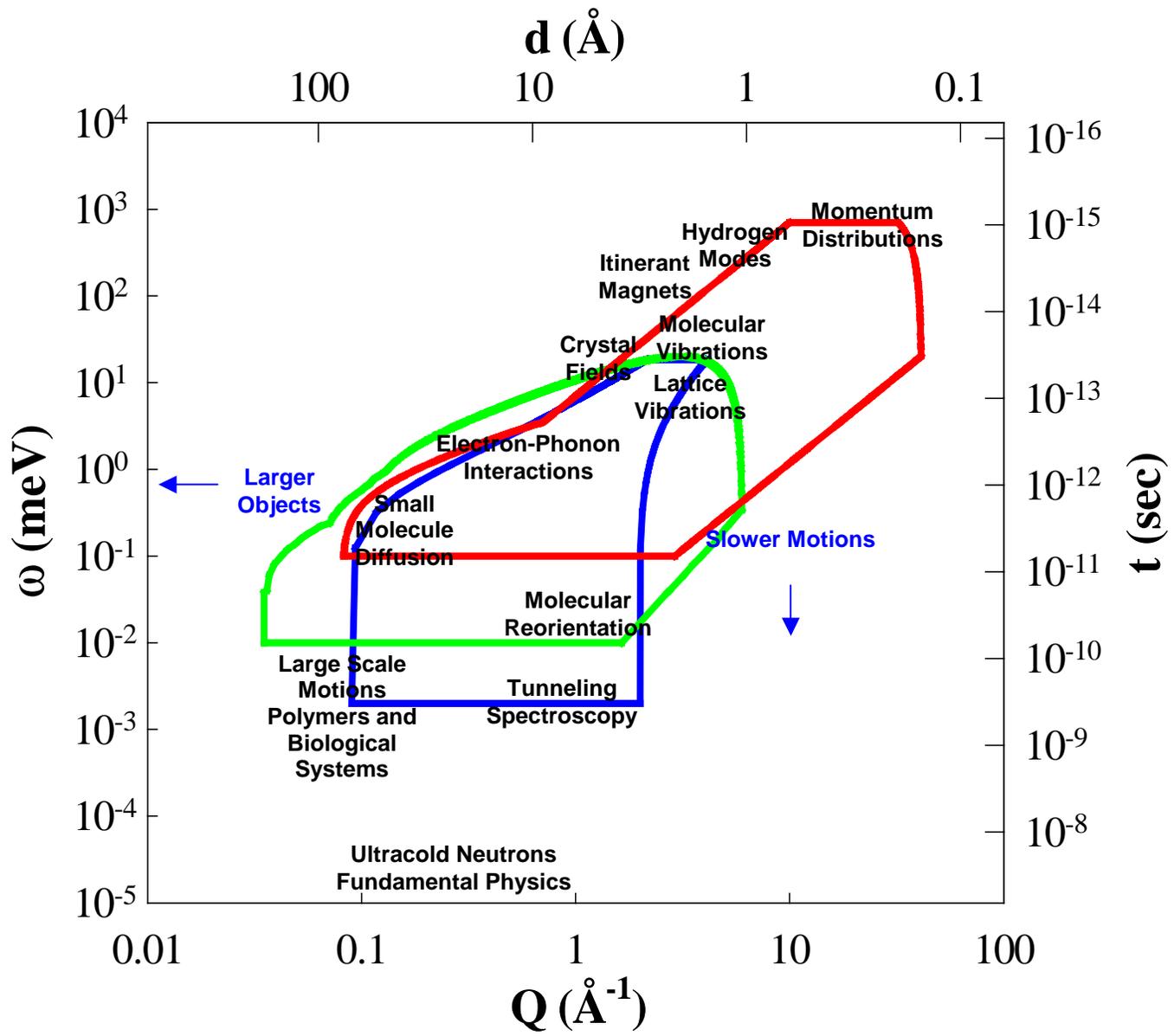
- Spin-echo spectrometer
- Polarized thermal neutron inelastic spectrometer
- Spectrometer for use with neutrons of several eV energy
- Beam line for fundamental neutron physics experiments
- Diffractometer dedicated for protein crystallography

Data sheets for these instrument ideas are not yet available



Instrument layout showing locations for the five SNS-funded and two externally-funded instruments currently defined. Various place-holder instruments are shown on the other beam lines to indicate what a fully-instrumented high power target station might look like.

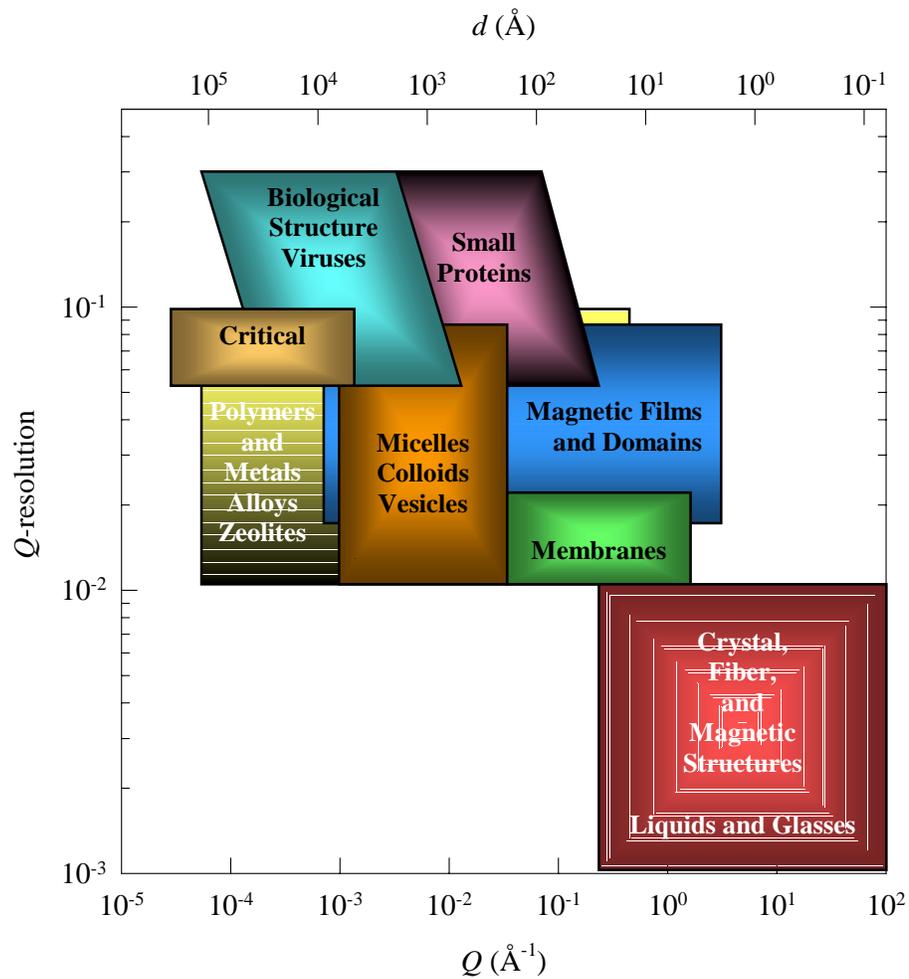
# Inelastic Scattering Instruments



- High-resolution Fermi Chopper Spectrometer
- Backscattering spectrometer
- Multi-Chopper Spectrometer

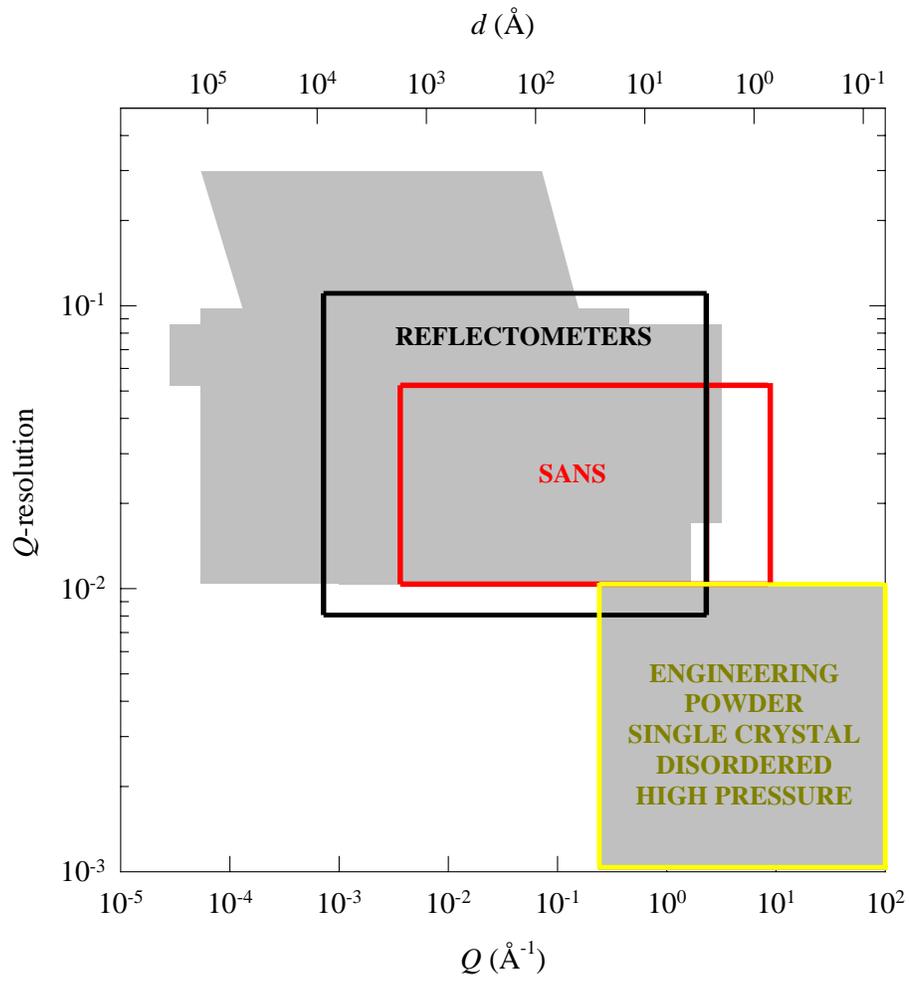
Science areas adapted from "Neutron Scattering Instrumentation for a High-Powered Spallation Source" R. Hjelm, et al., LA0-UR 97-1272

# Elastic Scattering Instruments



Types of science for elastic scattering instruments at different ranges of  $Q$  and  $Q$  resolution

## SNS Elastic Scattering Instruments



This graph shows how the current SNS elastic scattering instrument concepts map onto the various scientific regions shown on the previous plot