

Neutrons@Mac:

Building Networks for Canadian Neutron Scattering

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Canadian neutron scattering in the post-NRU era

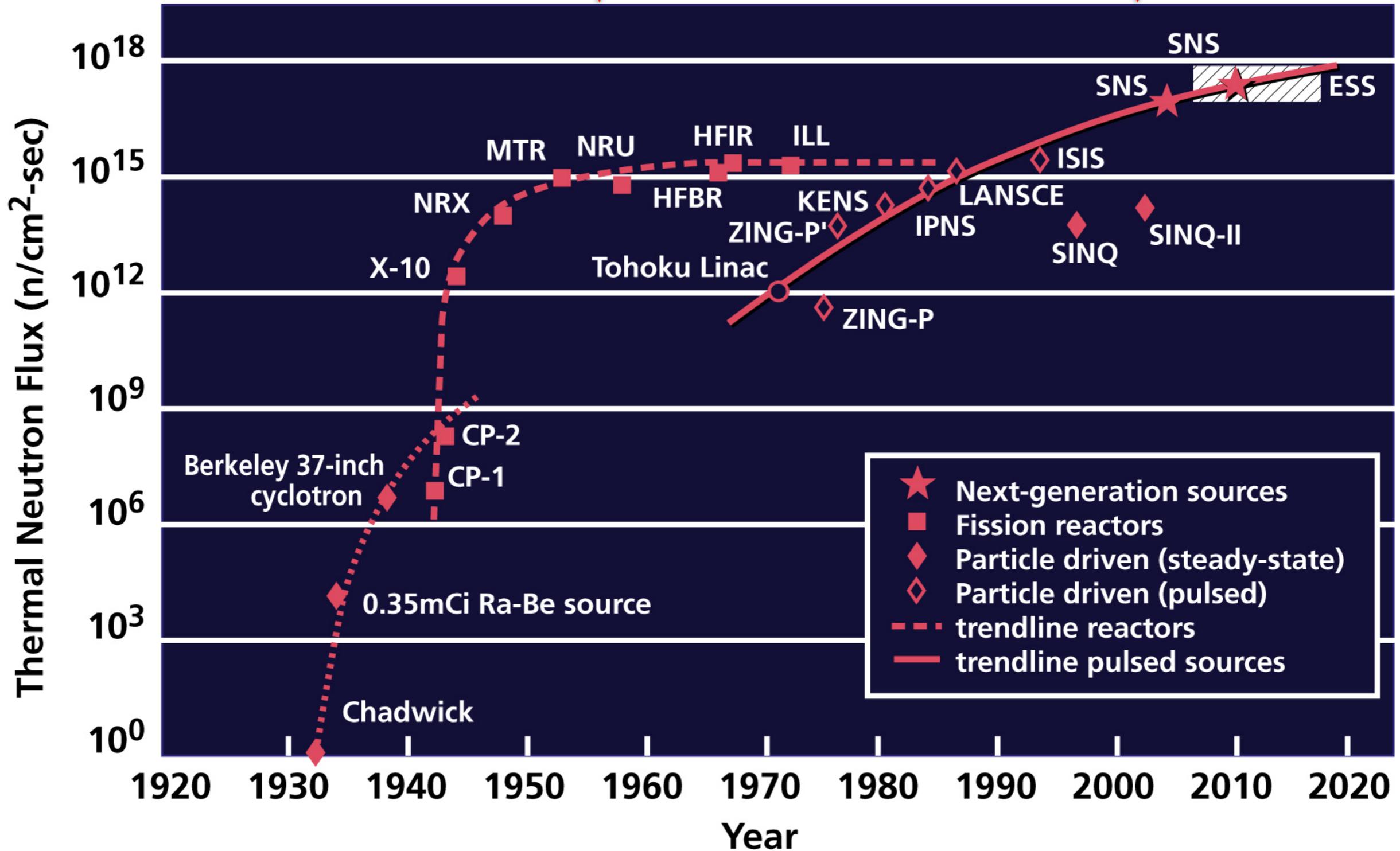
- *Canadian Participation at the SNS; Beamline development at MNR*
- *The Canadian Neutron Initiative*
- *Next CFI opportunity - Next NSERC RTI opportunities*

Need to organize across institutions for large proposals

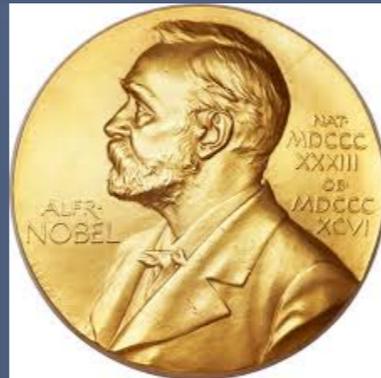
Today ~ 10,000 users worldwide:
drawn from all of materials science and engineering

Initial investment

~ \$8 B reinvestment

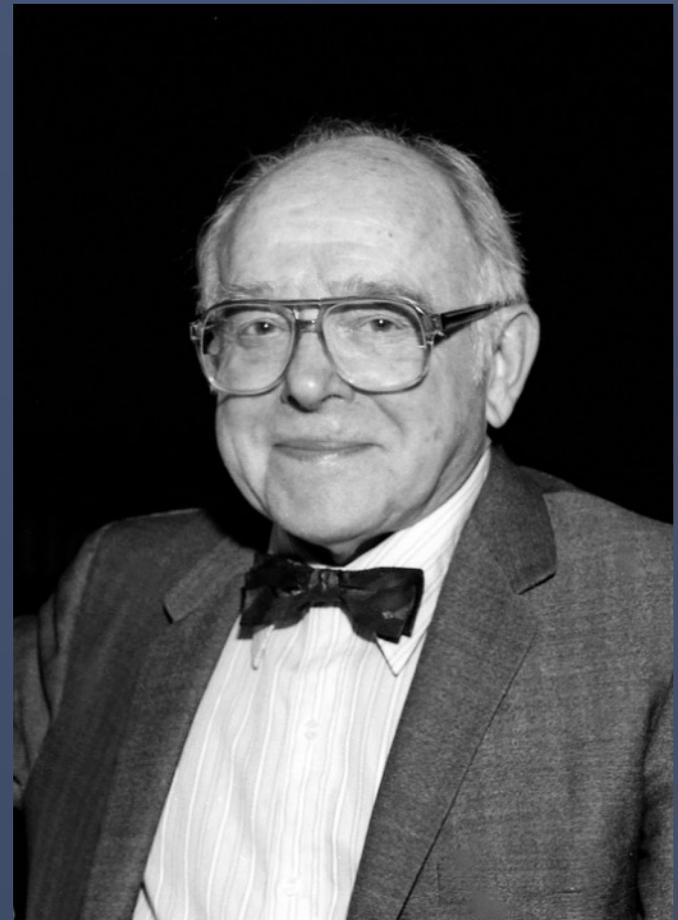


2019 is the 25th anniversary of Brockhouse-Shull Nobel Prize

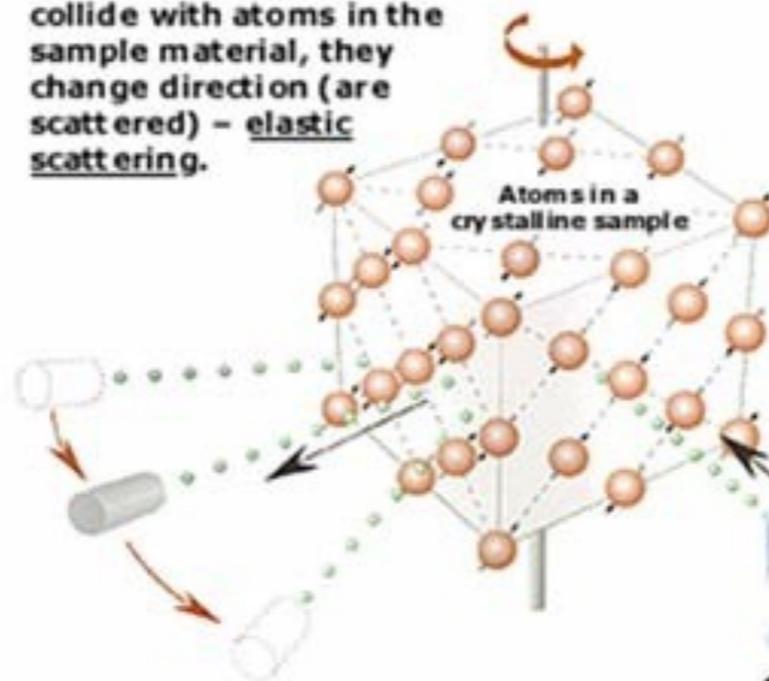


1994

Bertram Brockhouse & Clifford Shull

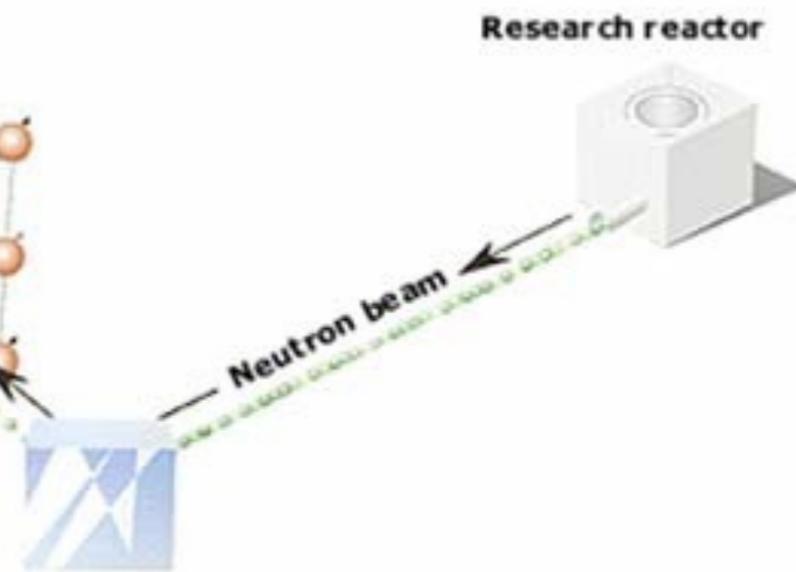


When the neutrons collide with atoms in the sample material, they change direction (are scattered) – elastic scattering.

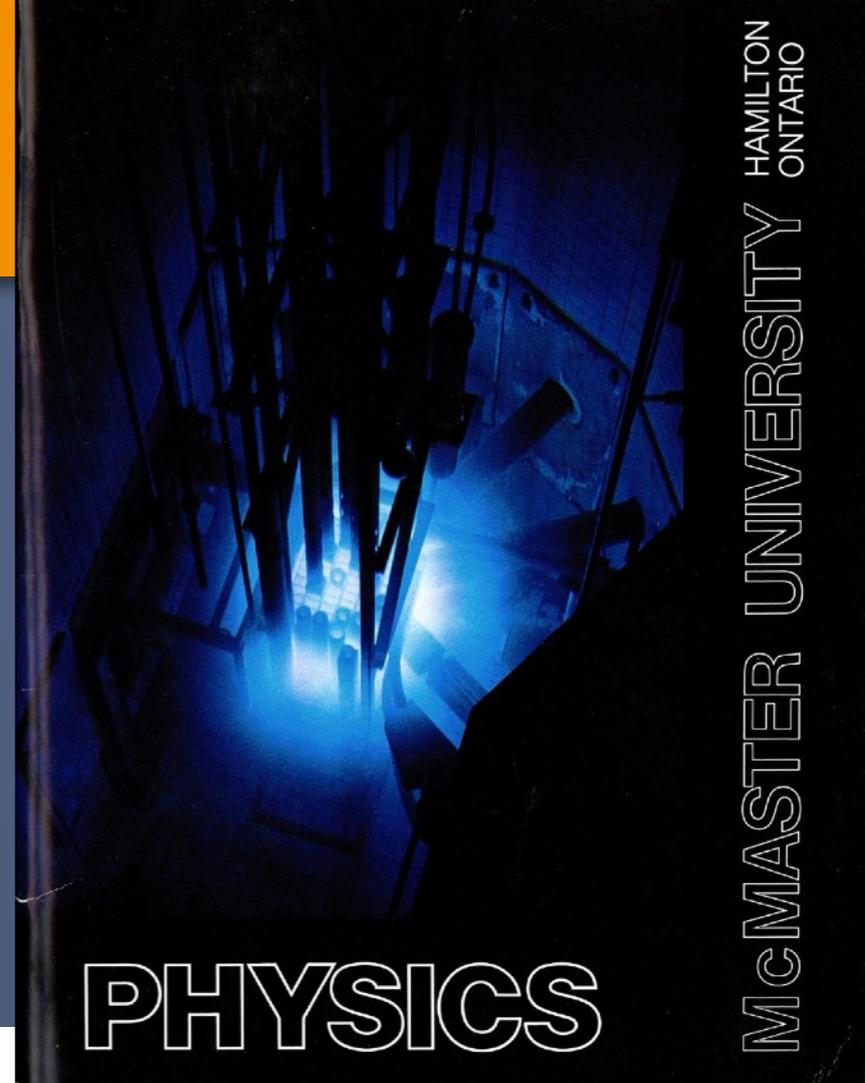


Detectors record the directions of the neutrons and a diffraction pattern is obtained.

The pattern shows the positions of the atoms relative to one another.

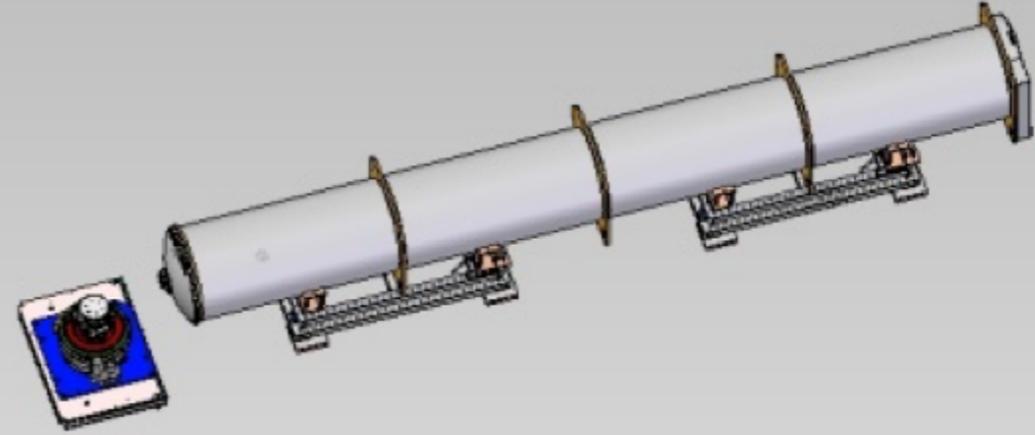
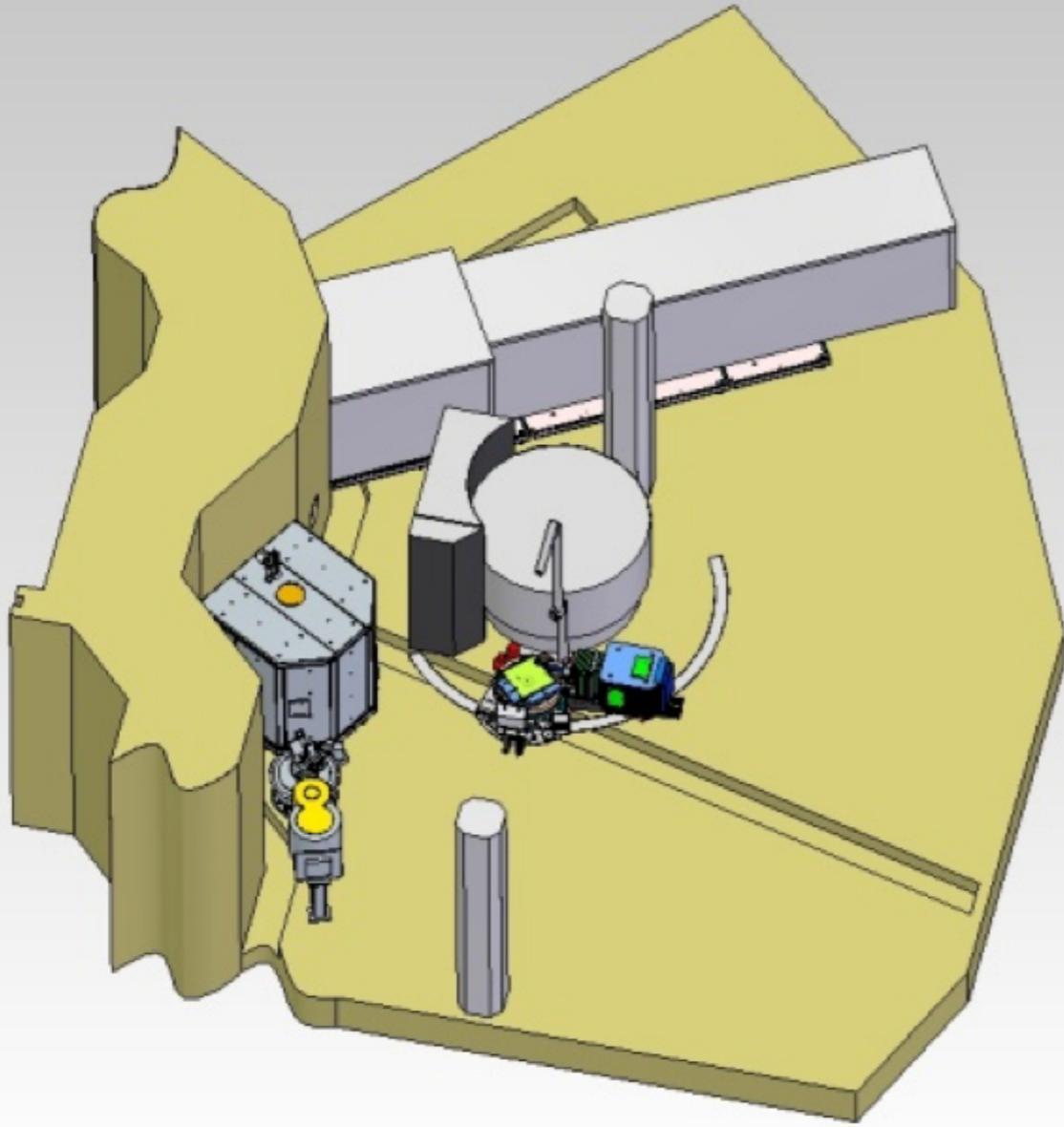


Crystal that sorts and forwards neutrons of a certain wavelength (energy) – monochromatized neutrons

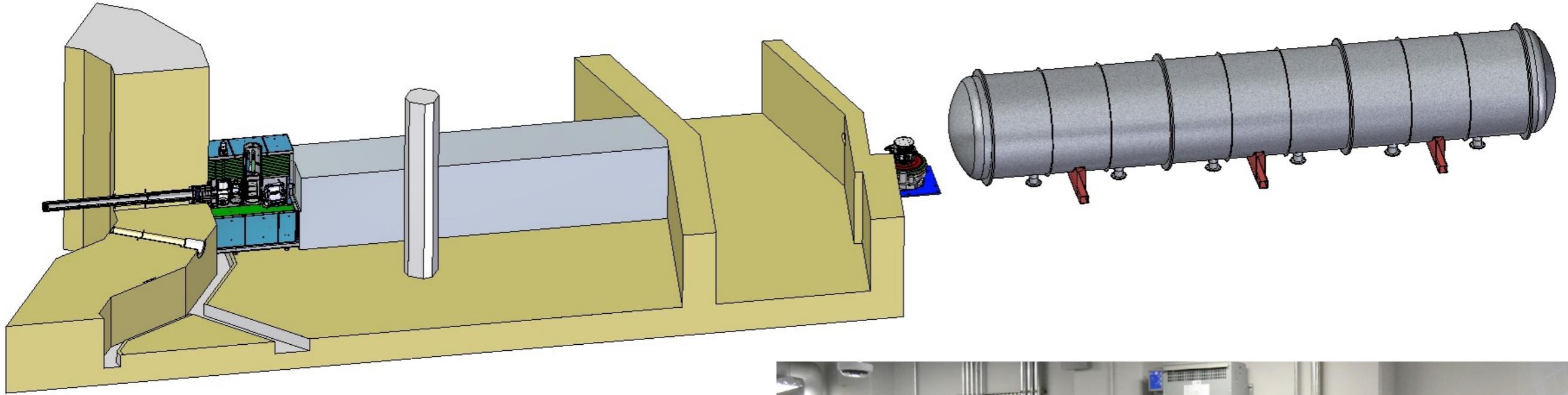


PHYSICS

New \$9M SANS instrument is advancing well Completion set for early 2019



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**2018 Federal Budget allocates
\$763M to CFI with \$160M to MSI**

**Next CFI IF competition will likely come before
next federal election - Fall 2018 to Spring 2019**

**We don't know the "ground rules" for the next
competition - but for planning purposes, it is best
to assume that a quota system and matching fund
requirements will be in place**

**For a large CFI ask (~ \$30M), we will need a multi-
institutional proposal drawing from partner
university quotas**

McMaster University will play a leadership role

2018 Federal Budget allocates \$763M to CFI with \$160M to MSI

Budget 2018 proposes to provide the Canada Foundation for Innovation with \$763 million over five years, starting in 2018–19, to provide the tools researchers need. This includes \$160 million for increased support to Canada's nationally important research facilities through the Foundation's Major Science Initiatives Fund. The Government also proposes to establish permanent funding at an ongoing level of \$462 million per year by 2023–24 for research tools and infrastructure supported through the Canada Foundation for Innovation.

What might a Neutron Scattering CFI Ask Look Like?

- **3 to 4 new neutron diffraction instruments
at MNR
\$10M - \$12M**
- **Foreign partnerships
(1 or 2, for 5 or 10 years)
\$10M**
- **Power and duty cycle upgrade to MNR
\$8M**

My guiding principles on these priorities

The MNR is a scarce resource and should be optimally exploited for Canadian neutron beam science.

Inelastic scattering is typically 100 x weaker than elastic scattering.

Focus on diffraction (elastic) at MNR, spectroscopy (inelastic) with Foreign Partners.

It is difficult and expensive to increase source strength. It is far more fruitful to pursue optimized neutron optics and instrumentation.

We need to plan for ancillary equipment at the MNR

- **Sample environment, sample changers**
- **Monochromators, filters and neutron optical devices, etc.**
- **We hope to take advantage of CNBC surplus equipment**

Needed ancillary equipment that is otherwise unavailable should be the focus of coordinated NSERC RTI applications
Annual Fall Deadline

What is your charge?

- **What should the next CFI ask look like?**
- **What ancillary equipment is required for the MNR in the short term (now) and the long term (~ 4 years) ?
How do we ensure we get it?**
- **What should the governance structure of this CFI initiative, and/or Neutrons@Mac, and/or CNI look like?**

What do we want you to do (after today)?

- **Go back to your home institution and meet with your Chair, Dean, and VPR.**
- **Alert them to our plans for this large, multi-institutional CFI Neutron Scattering initiative, and how important it is to your research, and to Canadian materials science.**
- **Ask them to think about what an appropriate governance structure for this would be.**