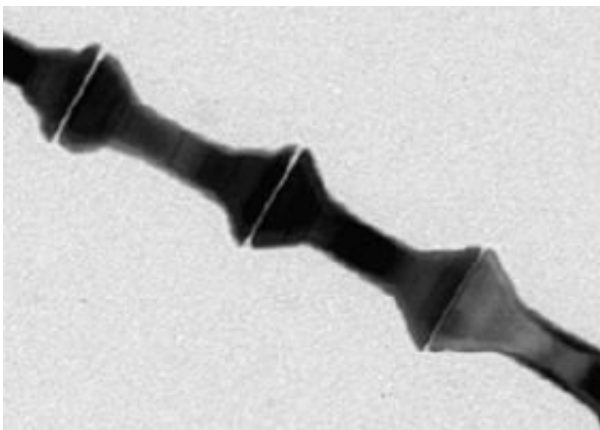


# How to probe tiny samples? Insights into the production of micron-sized cold neutron beams

July 9 2015

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String of small magnetic dumbbell (100nm long)

The NMI3 Imaging JRA discusses how to produce smaller beams. They conclude that reflective optics offers the most versatile way to produce them.

Neutron beams for condensed matter studies are traditionally big, macroscopic beams, mostly because of the limited [neutron flux](#). However to probe small samples with a high spatial resolution by [neutron imaging](#), it is necessary to use micro-sized (1–50  $\mu\text{m}$ ) thermal or cold neutron beams. A group of scientists from France, Russia and Spain have just published a paper where they discuss various possibilities to

produce such micro-sized neutron beams. This work is conducted within the NMI3 Imaging Joint Research Activity .

In the paper they describe three ways of producing sub-100  $\mu\text{m}$  thermal neutron beams by using:

1. collimation slits
2. reflected beams
3. neutron waveguides

They concluded that reflective optics offers the most versatile way to produce tiny [neutron beams](#) while also enhancing signal-to-background ratio. With this technique the size of the micro-beam can be easily tuned by simply rotating the reflecting mirror. Being able to work off the direct beam provides an excellent signal/noise ratio even if the incident neutron intensities are low. The scheme will be tested on the new radiography station IMAGINE at the Laboratoire Léon Brillouin in France.

**More information:** F. Ott, S. Kozhevnikov, A. Thiaville, J. Torrejon, M. Vázquez (2015), "Shaping micron-sized cold neutron beams," *Nuclear Instruments and Methods in Physics Research Section A*, 788, 29–34, [DOI: 10.1016/j.nima.2015.03.057](https://doi.org/10.1016/j.nima.2015.03.057)

Provided by NMI3: Integrated Infrastructure Initiative for Neutron Scattering and Muon Spectroscopy

Citation: How to probe tiny samples? Insights into the production of micron-sized cold neutron beams (2015, July 9) retrieved 26 April 2024 from <https://phys.org/news/2015-07-probe-tiny-samples-insights-production.html>

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