



FNPB – FUNDAMENTAL NEUTRON PHYSICS BEAM LINE

The FNPB provides neutron beams for a variety of experiments in nuclear and particle physics. This facility is designed to accommodate two classes of experiments: (1) cold neutron experiments that require intense, broad-spectrum beams and (2) ultracold neutron

experiments in which neutrons of ~ 1 meV are “down-converted” to near-zero energy in superfluid liquid helium. Experiments at the FNPB include precise measurements of the parameters that describe neutron beta decay, studies of the weak interaction between quarks, and a search for a non-zero neutron electric dipole moment. Each of the experiments at the FNPB requires the development, construction, and installation of major pieces of experimental equipment, and each experiment can take beams for periods of from several months to a few years.

FNPB is funded and operated by the Oak Ridge National Laboratory Physics Division.

APPLICATIONS

The FNPB is designed to address questions of interest in cosmology, nuclear and particle physics, and astrophysics. Among the questions that will be addressed are the origin of the light elements (big bang nuclear synthesis), the source of the cosmic matter-antimatter asymmetry, and the origin of parity violation.

Design model of the FNPB guide system showing the curved cold beam with four frame overlap choppers, as well as the monochromator housing and the ballistic ultracold neutron guide. The cold guide and choppers share a common vacuum to reduce window losses.

SPECIFICATIONS

Cold Neutron Beam Line	
Supermirror guide	Curved, $m = 3.6$
Beam area	100 x 120 mm
Choppers	Four frame overlap
Peak wavelength	3.5 Å

Independent secondary shutter
Floor pit for superconducting magnet

Ultracold Neutron Beam Line	
Guide	33 m ballistic
Wavelength	8.9 Å
Monochromator	Double-crystal alkali intercalated graphite

External building experimental area

Status: Available to users

FOR MORE INFORMATION, CONTACT

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