

References for Neutron Detectors

MIRROTRON Ltd Company was founded by physicists and engineers of the former Central Research Institute for Physics (KFKI Budapest) in 1991. Its activities are centered on scientific instrumentation, primarily related to neutron scattering. The company has been in good position to take advantage of Hungary's rapid move to market economy and to draw on the experience as well as the achievements of the Hungarian school of neutron scattering. A good example is the installation of a new cold source and supermirror neutron guide system as well as a set of neutron beam experimental stations at the 10 MW Budapest Research Reactor (BRR) in the past few years.

At the moment, MIRROTRON is working with 30 full time employees and regularly helped by about the same number of scientific expert consultants (by case by case contracts). MR's personnel and associated partners have long experience in instrument development, since the Company was formed by those scientists at the Budapest Research Reactor (BRR) who had been involved in many important neutron instrumentation projects in Europe. Some of the Company's leading persons spent several years at various outstanding laboratories such as ILL Grenoble, HMI Berlin, LLB Saclay or FLNP Dubna. The successful reactor and neutron scattering instrumentation upgrading at BRR has been also partly lead by this team. MIRROTRON's scientists have had a dominant involvement in instrument construction for about 16-20 neutron scattering spectrometers at 6 different European laboratories. Concerning neutron guides, MR has delivered neutron optical components or entire systems to the following laboratories:

ANSTO - Australian Nuclear Science and Technology Organisation; SNS - Oak Ridge, US; Berlin Neutron Scattering Center; Budapest Neutron Centre; Frank Laboratory of Neutron Physics, Dubna; ISIS T2 Rutherford Appleton Laboratory; Instiut Laue Langevin, Grenoble; Laboratoire Léon Brillouin, Saclay; Los Alamos National Laboratory; Argonne National Laboratory; JAEA Japan; CARR Beijing; INPC Mianyang.

Development and production of neutron detectors:

Multiwire one- or two-dimensional neutron detectors are provided by the group of the associated partners as below:












Neutron Spectroscopy Department at BNC-KFKI. The Department operates several experimental stations on the beam-lines and provides services for external users to perform experiments and exploit the obtained results. In order to maintain a high level experimental research capacity at modest financial frames, special efforts are devoted to enhance neutron beam intensity and develop various neutron scattering instrument components e.g. multilayer neutron optical elements (supermirrors). The detector development is a part of this activity. Since over 20 years the BNC-KFKI team works in the detector programme to develop, test and characterise detectors. In the various spectrometers operated at BNC several area detectors are in use. In the framework of collaboration this programme also aims the technology transfer to industry.








The department certifies the manufactured detector by neutronic measurement of all specified parameter.

MIRROTRON Ltd. also benefits from advice of an international team of expert consultants. MIRROTRON contributes to the detector programme by design, production and installation of devices. The company dedicated a department for detector development and production. Special new laboratories are prepared for the detector department like new high performance “clean-laboratories”, detector assembly shop with wiring machine, ultrasonic cleaner, special gas filling and re-gain system for handling, assembly and mounting of detector chambers; also developed the chamber (pressure vessel) fabrication technology in Hungary.

MIRROTRON co-ordinates the fabrication of specific detectors, processing and provides the quality assurance procedure and holds the responsibility of the good quality and operation of the detector systems delivered as well as it is responsible for the marketing and commercial activity.

References for Neutron Detectors

Institute - Instrument	Model	Qty	Year of Order	Reference person
HMI 	MK-200N-1, 2D PSD	1	2004	Dr. Thomas Wilpert
Dubna 	MK-200N-1, 2D PSD	1	2004	Prof. Dr. Gordeev
BNC 	MK-200N-1, 2D PSD	1	2004	Dr. László Rosta
RMKI 	MK-200N-1, 2D PSD	1	2004	Dr. László Bottyán
GKSS 	MK-300N-1, 2D PSD	1	2004	Heinz-Günter Brokmeier
INPC-SANS 	Detector system: MK-640N-1, 2D PSD with tank, rail system	1	2007	Dr. Chen Bo
INPC-SANS 	MK-115/30-BM Beam Monitor	1	2007	Dr. Chen Bo
ICCAS/CIAE – SANS 	MK-65/65-BM Beam Monitor	1	2008	Prof. Charles Han
INPC-TPNR 	MK-200N-1, TOF 2D PSD DAQ and Evaluation System	1	2008	Dr. Chen Bo
INPC-TPNR 	MK-125/15-BM Beam Monitor	1	2008	Dr. Chen Bo
IFE 	MK-600/800N-1, 2D PSD DAQ and Evaluation System	4	2008	Dr. Klaus Lieutenant

BNC - TAS FSANS		MK-200N-1, 2D PSD	2	2008	Dr. László Rosta
INPC-RSND CNTAS		MK-200N-1, 2D PSD DAQ and Evaluation System	2	2009	Dr. Chen Bo
INPC-RSND		MK-120/60-BM Beam Monitor	1	2009	Dr. Chen Bo
INPC-CNTAS		MK-130/30-BM Beam Monitor	1	2009	Dr. Chen Bo
IFE		MK-115/50-BM Beam Monitor	1	2010	Dr. Klaus Lieutenant
JAEA – JRR-3		MK-65/65-BM Beam Monitor	1	2010	Dr. Iwase
JAEA		MK-115/30-BM Beam Monitor	2	2010	Dr. Nakamura

Total : 15 pcs 2D PSD

5 pcs Large Area 2D PSD

9 pcs Beam Monitor

Neutron test measurement report (sample)



Report on J-Parc neutron beam monitor

Type: MR-115/30-BM
Serial N#: 01/117/2011

Beam monitor data

Overall size	202x80x23	mm ³
Active area	115x30	mm ²
Maximum high voltage	2000	V
Gas filling	N ₂ + ⁴ He+CF ₄	
Gas pressure	1,6	Bar
Connector	SHV	

Measurements conditions

Place of measurement	BNC	ATHOS
Neutron beam wavelength	2,8	Å
Beam intensity	2,1*10 ⁷	1/sec
Preamplifier	0,6	V/pC
Discriminator threshold level	35	mV

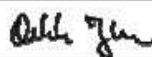
Used measuring instruments

LV Power supply	Ortec Minibin 4006
HV Power supply	Ortec 660
Preamplifier	Merlin-Gerin
Oscilloscope	Agilent MSO-8014


Results

Applied high voltage	1425	V
Measured efficiency @2,8 Å	(1,62±0,03)*10 ⁻⁵	
Calculated efficiency @1,8 Å	(1,04±0,02)*10 ⁻⁵	

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Date: 2011.02.25	Mirrotron Quality Assurance Department	Form Number: 270F
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