Instrument List

Select your instrument for a quick access

D1B

Detail of instruments by group

Diffraction

Technique: Powder diffraction

Name	Instrument type	Application	Techn
D7	Diffuse scattering spectrometer	• Magnetic short range order in frustrated magnets and spin-glasses • Studies of non-collinear ferromagnetism • Extended magnetic defects in antiferromagnetic materials	Powde diffrac

Name	Instrument type	Application	Techn
		• Studies of hydrogen diffusion in metals • Separation of collective and single particle excitations	
D4	Disordered materials diffractometer	• Short and intermediate range order in liquids and amorphous materials • Solving environment of atoms combining isotopic substitution and methods of first and second difference • Magnetic structure studies on very absorbent systems (containing Gd, Eu, etc. • Pair-Distribution Function (PDF) analysis of powder diffraction patterns	Powde diffrac
D2B	High-resolution two-axis diffractometer	• Structural chemistry of non-rigid molecules • Ab-initio structure solution from powders • Crystal and magnetic structure determination of powder compounds (even small samples)	Powde diffrac

Name	Instrument type	Application	Techn
		• Dependance in temperature/pressure/magnetic field structural (or magnetic) studies for powders	
D20	High intensity two-axis diffractometer with variable resolution	• Thermodiffractometry • Magnetism • Kinetics • Multi-stroboscopy • Texture • Very small samples • Highly absorbing samples • Disordered systems • Physisorption	Powde diffrac
D1B	Two-axis diffractometer	• Determination of magnetic structure • Study of spin reorientation transitions • Phase transitions investigated by thermodiffractometry • Time resolved experiments kinetics studies • Dynamical studies in solid state chemistry • In situ neutron diffraction	Powde diffrac

Name	Instrument type	Application	Techn
		• In situ chemistry, chemical intercalation via solid-gas reaction • Texture analysis • Physisorption	

Technique: Single crystal diffraction

Name	Instrument type	Application	Techni

D3	Spin polarised hot neutron diffractometer	• High field configuration: Magnetic from factors; Magnetisation distributions
		• Zero-field configuration:
		  • Non-collinear magnetic structures
		  • Antiferromagnetic form factors
		  • Spherical polarimetry
		• Liquids configuration: structure of liquid and amorphous materials
			Single crystal diffract

Name	Instrument type	Application	Techni
		with high hydrogen content	
D23	Thermal neutron two-axis diffractometer for single-crystals D23	• Determination of magnetic structures (in high field and/or high pressure, and at low temperature: Study of magnetic phase diagrams (field-temperature pressure-temperature, or both) • Determination of magnetisation density maps (with the polarised neutron option) - Mainly in condensed matter physics: Strongly correlated electron systems (heavy fermion systems; borocarbides compounds; low dimensional magnetic systems; charge/orbital ordering systems) • Molecular magnetism	Single crystal diffract

Name	Instrument type	Application	Technic
D9	Hot neutron 4-circle diffractometer	• General themes: structural phase transitions ; atomic anharmonicity; structural disorder; hydrogen bonding; packing of organic molecules; magnetic structures, especially Gd ; electron density studies; twinning and superlattice problems; ordering in alloys • Fundamentals of diffraction: extinction effects; test of dynamical theory; thermal diffuse scattering; resonance scattering • Special use: atomic resolution neutron holography	Single crystal diffract
OrientExpress	Laue-neutron diffractometer	• Fast single-crystal sample orientation • Assessment of sample quality	Single crystal diffract

Name	Instrument type	Application	Techni
D10	4-circle diffractometer with three-axis energy analysis	• Conventional crystallography • Magnetic crystal structures • Modulated structures • Phase transitions, phase diagrams • Diffraction at extremely high or low temperatures, under pressure, or in high magnetic fields • Diffuse scattering • Quasi-elastic scattering • Crystalline thin films and multilayers • Inelastic scattering in four-circle geometry	Single crystal diffract

Large-Scale Structure

Technique: Powder diffraction

Name	Instrument type	Application	Technique	Sci dor
D16	Small momentum transfer diffractometer	• Biology/Biophysics • Colloids/Surfactants • Polymer physics • Materials science • Surface science	Powder diffraction Small angle neutron scattering SANS	Ene Env Sof and pol Life sci Hea

Technique: Single crystal diffraction

Name	Instrument type	Application	Technique	Scienc domai
DALI	Quasi-laue diffractometer	• single-crystal neutron diffraction studies of biological macromolecules at high resolution (1.5 - 2.5Å). • visualisation of key hydrogen or deuterium atoms within biological macromolecules, identifying the	Single crystal diffraction	Life scienc Health

Name	Instrument type	Application	Technique	Scienc domai
		protonation states of charged residues, the exact hydrogen-bond networks of bound small molecules or inhibitors, and the orientation of water molecules.		

Technique: Small angle neutron scattering SANS

Name	Instrument type	Application	Technique	S c
D11	Lowest momentum transfer & lowest background small-angle neutron scattering (SANS)	• Polymers and colloids • Polymer blends; solutions; Micelles; Dendrimers; Liquid crystals; Gels; Reaction kinetics of mixed systems • Materials science • Phase separation in alloys and glasses;	Small angle neutron scattering SANS	E S a p L s H

Name	Instrument type	Application	Technique	S c
		Morphologies of superalloys; Microporosity in ceramics; Interfaces and surfaces of catalysts • Biological macromolecules - Size and shape of proteins; nucleic acids; Biomembranes; Drug vectors • Magnetism • Flux line lattices in superconductors; Magnetic correlations		
D22	Large dynamic range small-angle diffractometer	• Soft matter • Polymer, colloids, membranes and self assembly • Biological macromolecules in solution • Biophysics - Magnetism, Nanoscale structure of materials • SEC-SANS, Rheo-SANS	Small angle neutron scattering SANS	E S a p L s H

Name	Instrument type	Application	Technique	S d
		• Kinetic studies • TISANE		
D33	Massive dynamic q-range small angle diffractometer	• Nano and mesoscale materials • Magnetism -Materials science • Polymers and colloids • Self assembly of surfactants • Biology and biophysics	Small angle neutron scattering SANS	N a c r E S a p L s H
D16	Small momentum transfer diffractometer	• Biology/Biophysics • Colloids/Surfactants • Polymer physics • Materials science • Surface science	Powder diffraction Small angle neutron scattering SANS	E E S a p L s H
SAM	Small-angle diffractometer	• Soft condensed matter: organic & inorganic colloidal particles, polymers blends or in solution, gels, liquid crystals, self-assembly of	Small angle neutron scattering SANS	N a c r C r S

Name	Instrument type	Application	Technique	S d
		surfractant molecules, ionic liquids, deep eutectic solvents • Biology: proteins, nucleic acids, biomembranes, vectors for drug delivery • Material science: phase separation in alloys & glasses, morphologies of superalloys, microporosity in ceramics, interfaces & surfaces of catalysts, radiation-induced damages in steels • Magnetism & superconductivity: flux line lattices in superconductors, magnetic correlations, long-period structures (e.g. helimagnets), superparamagnets, magnetic nanoparticles		a p L s

Technique: Reflectometry

Name	Instrument type	Application	Technique
FIGARO	Fluid Interfaces Grazing Angles Reflectometer	• specular scattering from 'free liquid' (air/liquid, liquid/liquid) samples but also air/solid and solid/liquid interfaces • off-specular scattering and GISANS from the above sample types • kinetics phenomena on a minute or slower time scale	Reflectometry

Name	Instrument type	Application	Technique
D17	Neutron reflectometer with horizontal scattering geometry	• Study of surfaces and buried interfaces of thin solid films and multilayers • Solid-liquid interfaces and membranes • Examination of off-specular reflectivity from atomic and magnetic in-plane structure • Kinetic studies of interface evolution	Reflectometry
SuperADAM	Advanced reflectometer for the analysis of materials	• Solid Films and Superlattices • Soft Films and	Reflectometry

Name	Instrument type	Application	Technique
		Multilayers • Materials Science Topics • Technical developments	

Spectroscopy

Technique: Time of flight spectrometry

Name	Instrument type	Application	Technique
PANTHER	Thermal neutron time-of-flight spectrometer	• Crystal field excitations, spin-waves in magnetically ordered materials, magnetic excitations in quantum and/or frustrated magnets. • Lattice dynamics: phonon dispersion and phonon density of states. • Vibrational spectroscopy in the lower energy range.	Time of flight spectrometry

Name	Instrument type	Application	Technique
		• Quantum rotations/translations of small molecules in confinements.	
IN5	Disk chopper time-of-flight spectrometer	• Local and long-range diffusion in disordered systems (liquids, molecular crystals, amorphous solids -superionic glasses, orientational glasses, spin glasses • Polymers, hydrogen-metal systems, ionic conductors • Dynamics of 'soft matter', including gels, proteins and biological membranes • Dynamics of quantum liquids • Rotational tunnelling in molecular crystals • Crystal field splitting • Spin dynamics in high-TC superconductors	Time of flight spectrometry

Name	Instrument type	Application	Technique
		• Critical scattering phenomena in dense gases and solids	
SHARPER	Cold neutron time-focussing TOF spectrometer	• Dynamics and relaxation properties in condensed matter exploiting both nuclear and magnetic scattering • Vibrational density of states of crystalline and amorphous solids • Dynamics of soft condensed matter such as polymers, proteins, biological membranes and gels • Local and long range diffusion of liquids, solutions and confined systems • Properties of quantum liquids, Fermi and non-Fermi systems • Phase transitions and quantum critical phenomena in	Time of flight spectrometry

Name	Instrument type	Application	Technique
		polycrystals and single crystals • Spin dynamics in high-Tc superconductors • Properties of crystal field splittings	

Technique: 3 axes spectrometry

Name	Instrument type	Application	Technique	Sc do
IN8	High-flux thermal 3-axis spectrometer	• Magnetic excitations, lattice vibrations and excitations in liquids • Samples of small volume and weak inelastic response due to its high incident flux	3 axes spectrometry	Ma an qu ma

Name	Instrument type	Application	Technique	Sc do
IN20	Thermal 3-axis spectrometer with polarisation analysis	• Magnetic fluctuations and quantum critical points • Spin waves and their coupling to lattice modes • Crystal field excitations • Spin canting in amorphous magnets • High resolution line-width studies (TASSE)	3 axes spectrometry	Ma an qu ma
IN12	Cold 3-axis spectrometer	• low energy magnetic excitation spectrum • lattice dynamics at low frequency • critical scattering and phase transition phenomena • weak static magnetic	3 axes spectrometry	Ma an qu ma

Name	Instrument type	Application	Technique	Sc do
		moments (10-2 μB) - Magnetic multilayers • dynamics of the glass transition at low momentum transfer • dynamics of amorphous materials at low momentum transfer • dynamics of biological model membranes		
IN22	Thermal 3-axis spectrometer with polarisation analysis	• Magnetic and structural excitations on single crystal with neutrons of 5-100 meV incident energy • Longitudinal and spherical polarimetry of elastic or inelastic contributions	3 axes spectrometry	Ma an qu ma

Name	Instrument type	Application	Technique	Sc do
		(spherical polarimetry allowing measurements of inelastic nuclear-magnetic interference terms) • Polarized neutron inelastic scattering up to 12T magnetic field. • Magnetic phase diagram up to 40T with large pulsed magnetic field. • Life-time of magnetic and structural excitations with Neutron Resonance Spin Echo (NRSE) option • Experiments requiring a good resolution in wave vector and a low intrinsic		

Name	Instrument type	Application	Technique	Sc do
		neutron background		
ThALES	Cold Triple-Axes Spectrometer with polarisation option	• Very high cold neutron flux and good signal-to-noise • Excitations in magnetically ordered and disordered system • Correlated electron systems • Unconventional superconductors • Frustrated and low-dimensional systems • Spin liquid systems • Spin-lattice coupling, electro-magnon • Multiferroic materials • Low-lying lattice excitations,	3 axes spectrometry	Ma an qu ma

Name	Instrument type	Application	Technique	Sc do
		phason modes		

Technique: Spectrometry backscattering

Name	Instrument type	Application	Technique
IN16B	High flux cold neutron backscattering HR spectrometer	• An ideal application for backscattering spectroscopy is rotational tunneling of molecular rotors (e.g. -CH3,-NH4). New developments in this field have arisen from combining neutron spectroscopy and molecular dynamics simulations. Tunneling in amorphous systems were first detected on IN16 as quasielastic broadening.	Spectrometry backscattering

Name	Instrument type	Application	Technique
		• Hyperfine splitting of some elements (e.g. Co, Nd, Ho, V,...) is another example for inelastic spectroscopy in the micro-eV energy range. • relaxation processes in glasses, H-diffusion in metals or proton and ionic conductors as well as diffusion of molecules confined in host matrices. Sometimes this research is related to fundamental studies for applications as energy materials or catalysis. • study of local dynamics in complex materials like polymers, membranes and biological samples	

Name	Instrument type	Application	Technique
		• biology: membranes and protein dynamics protein/membrane interactions extreme environmental conditions in biosciences and biotechnology in-vivo studies	
IN13	Thermal neutron backscattering spectrometer	• polymers and saccharides: saccharides and trehalose dynamics ; main chain and side chain motions in polymers ; conducting acid-doped polymers rotator phases • confined media and inclusion compounds - Quasicrystals	Spectrometry backscattering

Technique: Spin echo scattering

Name	Instrument type	Application	Technique	Science domain
IN15	Spin-echo spectrometer with time-of-flight and focusing options	• dynamics in soft colloidal structures (e.g. liposomes, proteins, micelles, microemulsions) • reptation in polymer melts • alpha relaxation in glass-forming polymers • diffusion of molecules in confined media • magnetic excitations • spin glass dynamics • phonon linewidths	Spin echo scattering	Magneti and quantun material Soft mat and polymer Life science Health
WASP	High-intensity spin-echo spectrometer	• Study of the motion of biological functional groups	Spin echo scattering	Energy Environr Life science Health

Name	Instrument type	Application	Technique	Science domain
		• Diffusive dynamics in incoherent scatterers • Dynamics in molecular magnets • Dynamics of 1d and 2d confined molecules • Development of new models for systems near the glass transition • Small samples (magnetic or other)		

Applied Science

Technique: Tomography

Name	Instrument type	Application	Technique	Scien domai
MoTo	Monochromatic Tomography	• Neutron tomography with	Tomography	Chemi materi Reacti and

Name	Instrument type	Application	Technique	Scienc domai
		quantitative determination of the linear attenuation coefficient • Neutron imaging using grating interferometry for spatially resolved ultra-small-angle scattering technique • Polarised neutron imaging to investigate magnetic domains		cataly Energ Enviro Life scienc
NeXT	Neutron and X-ray Tomography instrument	• Energy storage like Li-ion batteries and fuel cells • Porous media • Earth sciences	Tomography Radiography	Engine Energ Enviro

Name	Instrument type	Application	Technique	Scienc domai
		• Materials Science • Engineering and metallurgy • Cultural and Natural Heritage • Water transport in plants or porous media • Wavelengths selective imaging to exploit diffraction contrast (Bragg edges) of different materials • Magnetic fields and domains		

Technique: Micro tomography

Name	Instrument type	Application	Technique	Science domain
PorTo	Cold Neutron Tomography	• Material science and Engineering • Energy science and battery studies • Additive manufacturing and metallurgy • Earth and planetary Sciences • Fluid flow and percolation • Porous media research - Food science	Micro tomography Radiography	Chemistr materials Reaction and catalysis Energy Environm

Technique: Radiography

Name	Instrument type	Application	Technique	Science domain
PorTo	Cold Neutron Tomography	• Material science and Engineering	Micro tomography Radiography	Chemistr materials Reaction

Name	Instrument type	Application	Technique	Science domain
		• Energy science and battery studies • Additive manufacturing and metallurgy • Earth and planetary Sciences • Fluid flow and percolation • Porous media research - Food science		and catalysis Energy Environm
NeXT	Neutron and X-ray Tomography instrument	• Energy storage like Li-ion batteries and fuel cells • Porous media • Earth sciences • Materials Science • Engineering and metallurgy	Tomography Radiography	Engineer Energy Environm

Name	Instrument type	Application	Technique	Science domain
		• Cultural and Natural Heritage • Water transport in plants or porous media • Wavelengths selective imaging to exploit diffraction contrast (Bragg edges) of different materials • Magnetic fields and domains		

Technique: Strain stress scanning

Name	Instrument type	Application	Technique	Scier doma
Salsa	Strain Imager for Engineering Applications	• Domains • Materials properties and behaviour	Strain stress scanning	Engir

Name	Instrument type	Application	Technique	Scien doma
		• Nuclear industry • Automotive components • Aeronautical parts • Terrestrial transport applications • Civil engineering • Nanotechnology • Metal and ceramic coatings • Surface Processing • Marine transport • Construction materials • Fatigue analysis • Materials • Metal Matrix Composites • Nickel base superalloys • Steels; Ceramics		

Name	Instrument type	Application	Technique	Scien doma
		• Aluminium and Magnesium alloys • Titanium technology • Novel materials • Shape memory alloys		

Technique: Neutron Irradiation

Name	Instrument type	Application	Technique	Science domain
TENIS	Thermal and Epi-thermal Neutron irradiation Station	Thermal neutron irradiation of electronic devices	Neutron Irradiation	Engineering

Nuclear & Particle Physics

Technique: NPP facility

Name	Instrument type	Application	Technique	Scie dom
S18	Thermal neutron interferometer	The CRG instrument S18 is a perfect crystal neutron interferometer which can also be configured as a high resolution Bonse Hart camera. This instrument can be used for precise measurement of neutron scattering lengths and for basic neutron quantum optics studies and related phenomena. Applications: neutron interferometry, measurement of basic quantum physics laws; measurement of neutron-nuclei scattering lengths; quantum contextuality; decoherence; dephasing and depolarisation experiments; experiments with	NPP facility	

Name	Instrument type	Application	Technique	Scie dom
		non-classical neutron states.		
PN1	Fission product spectrometer (Lohengrin)	The main directions of research on PN1 were in the past centered around studies of the fission process but are now more and more concentrated on spectroscopy of very neutron rich nuclei. To this purpose two Germanium Clover detectors and ancillary detectors were purchased in the M0 phase of the Millenium project. The recoil mass separator for unslowed fission products LOHENGRIN uses fission products originating from a source of fissile isotopes placed in a beam tube (H9) near the core of the reactor. Specific fission products are	NPP facility	

Name	Instrument type	Application	Technique	Scie dom
		selected by a combination of a magnetic and an electric sector field whose deflections are perpendicular to each other. The freely recoiling fission products are analyzed according to their energy over ionic charge (E/q) and mass over ionic charge (A/q) ratios.		
PF2	Ultracold neutron beam facility	The ultracold neutron facility PF2 was built by TU Munich in collaboration with ILL. It provides a density of 50 cmˆ-3 of ultracold neutrons (UCN) with speeds less than 6 m/s. UCN are produced at the top end of a vertical guide where neutrons with speeds of 50 m/s are converted by the so-called Steyerl turbine	NPP facility	

Name	Instrument type	Application	Technique	Scie dom
		into UCN. The UCN are then led by horizontal guides to several experiments in parallel. There is also an output for very cold neutrons (VCN) with a wavelength of 100Å. The fact that neutron are electrically neutral makes it possible to store UCN in traps. The majority of the measurements carried out at PF2 use this feature. Recent experiments concerned - amongst others - the measurement of the neutron lifetime, the measurement of the neutron electric dipole moment and the study of "anomalous losses" of stored neutrons.		

Name	Instrument type	Application	Technique	Scie dom
Ricochet	None	RICOCHET is an international collaboration aiming to explore the Coherent Elastic Neutrino-Nucleus Scattering (CeνNS), a long-predicted interaction that was observed experimentally only in 2017. A precise measurement of the nuclear recoil spectrum for reactor neutrinos, where the process is fully coherent, could reveal deviations from the Standard Model of particle physics, potentially unlocking the door to new physics. The RICOCHET experiment is installed at the ILL only 8.8 meters away from the core of the High Flux Reactor. This proximity provides an intense	NPP facility	

Name	Instrument type	Application	Technique	Scie dom
		neutrino flux of approximately 10^{12} neutrinos/cm²/s, ideal for studying CEνNS at low (sub-keV) recoil energies.		
FIPPS	Gamma-ray spectrometer for thermal neutron induced reactions	FIPPS is ILL's gamma-ray spectrometer for thermal-neutron-induced reactions. It is composed of a highly collimated halo-free pencil neutron beam impinging on a stable or radioactive target surrounded by a high resolution high-purity germanium detectors array. It is used for: studies of the fission process of heavy elements and of the structures of neutron rich matter; level densities as input for astrophysical calculations; search for doorway states for	NPP facility	

Name	Instrument type	Application	Technique	Scie dom
		populations of long-lived isomers with medical applications by photo-excitation; precise knowledge of fission yields and decays of fission products; development of future nuclear reactors, fuel breeding schemes and nuclear waste transmutation.		
PF1B	Polarised cold neutron beam facility	Installed at the end position of the cold ballistic supermirror guide H113, PF1B provides the strongest polarised and unpolarised cold neutron beam in the world currently available for particle and nuclear physics (2x10^10 neutrons/(cm^2.s); the guide cross section is 6x20 cm^2). It is the simplest but most flexible	NPP facility	

Name	Instrument type	Application	Technique	Scie dom
		instrument at the ILL. Some of the experiments just use its neutron beam, other profit from its many devices needed to polarise, form, characterise, shield or remove the neutron beam. Recent experiments comprise measurements of neutron decay asymmetry coefficients and of properties of the neutron, studies of asymmetries in neutron capture reactions and neutron induced fission, nuclear spectroscopy of fission products, and measurements of fission cross-sections and yields of ternary particles in fission.		
SuperSUN	Super Ultracold	The ultracold neutron source SuperSUN is a	NPP facility	

Name	Instrument	Application	Technique	Scie

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