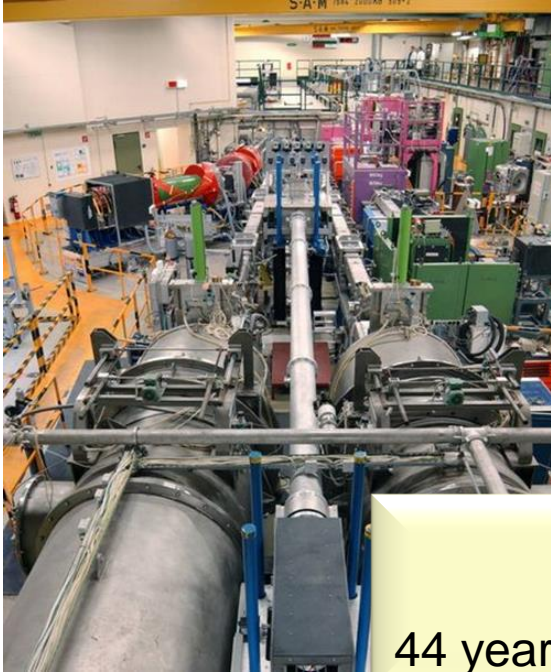


THE JÜLICH CENTRE FOR NEUTRON SCIENCE

Thomas Brückel | JCNS-2 & PGI-4: QUANTUM MATERIALS & COLLECTIVE PHENOMENA

THE PAST: NEUTRON SCATTERING AT FZJ

The DIDO / FRJ-2 reactor: 44 years of operation for the German neutron community



2 May 2006, 8:30:
permanent shutdown after
44 years of service for the scientific community

A USER FACILITY WITHOUT OWN NEUTRON SOURCE

Foundation of the **Jülich Centre for Neutron Science** - The Phoenix: Reinvent yourself



11 instr.*

1 (+2) instr.+



1 (+2) instr.

triple axis spectrometer IN12
&
IN22 / D23 (CEA)



spin echo NSE
&
BASIS / POWGEN (ORNL)

MISSION: BEST INSTRUMENTS AT BEST SOURCES

Fulfilling Central Helmholtz Missions: User Facilities & Solution of Grand Societal Challenges



LICH
Lichtzentrum

USER OPERATION WITH JCNS INSTRUMENT RESPONSIBLES

Our main hub **Heinz Maier-Leibnitz Zentrum MLZ**: Open Peer Review Access



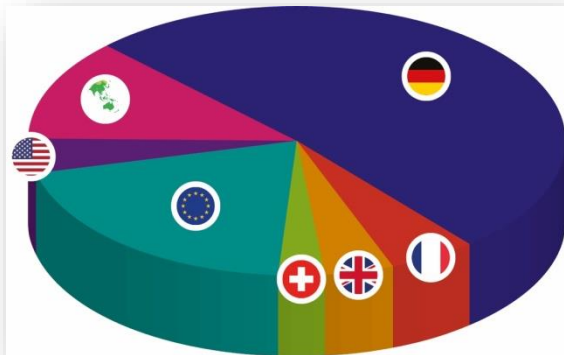
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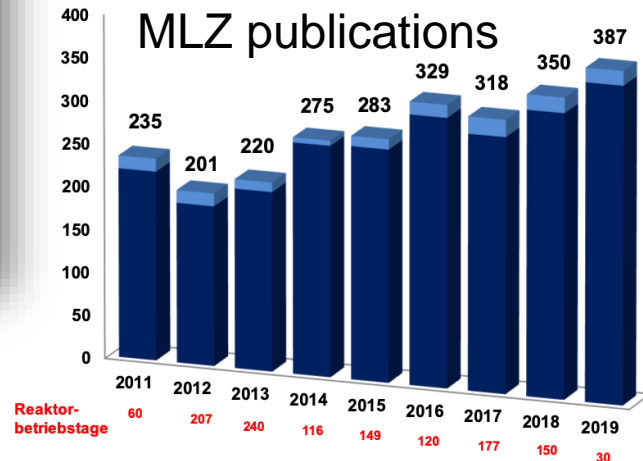
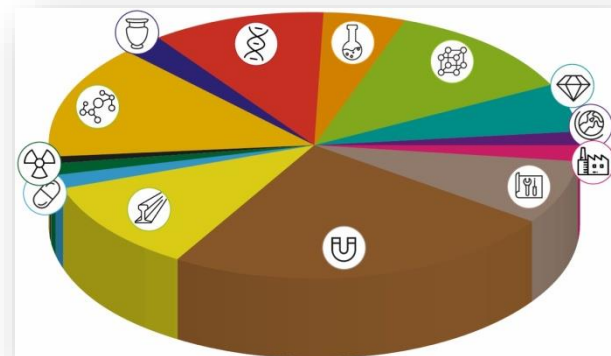
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User home country:

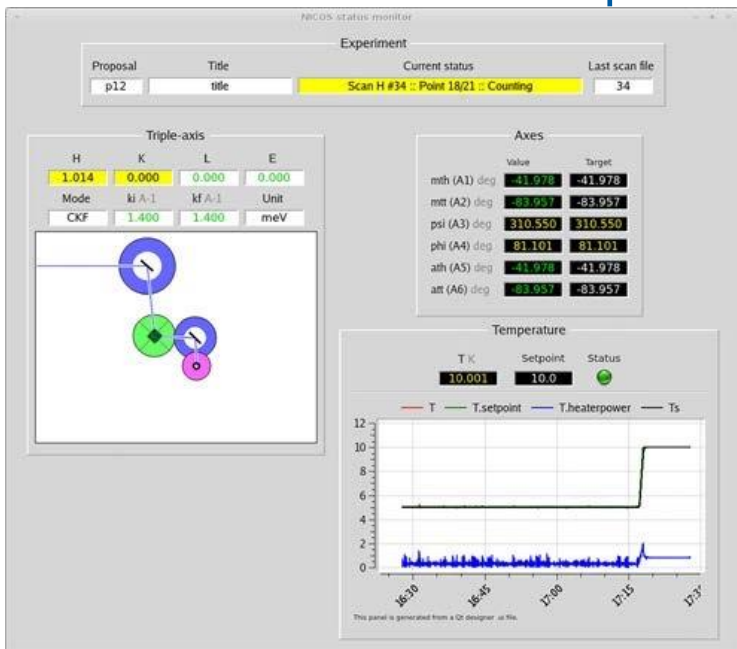


Scientific fields:



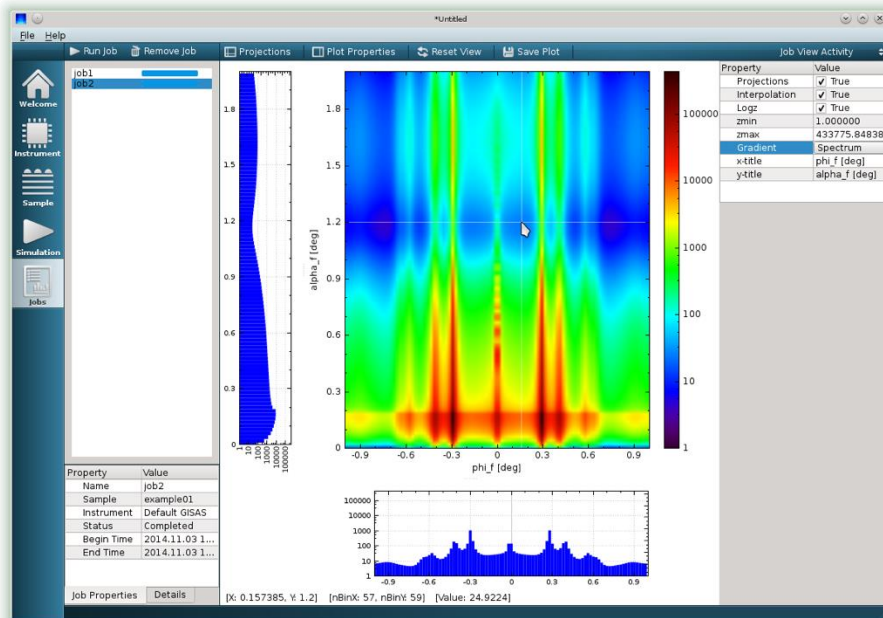
SERVICE FOR USERS: SOFTWARE DEVELOPMENT

Instrument Control Group



standardized NICOS instrument control
plug-and-play sample environment box

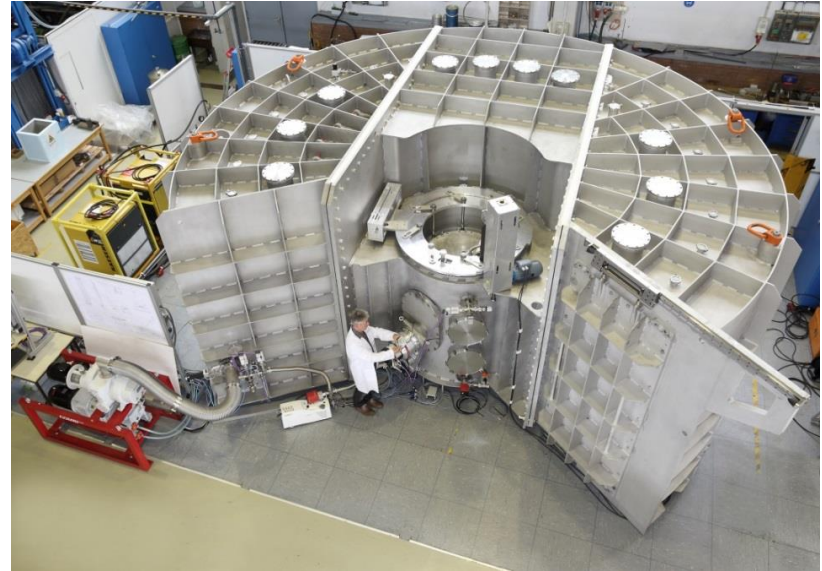
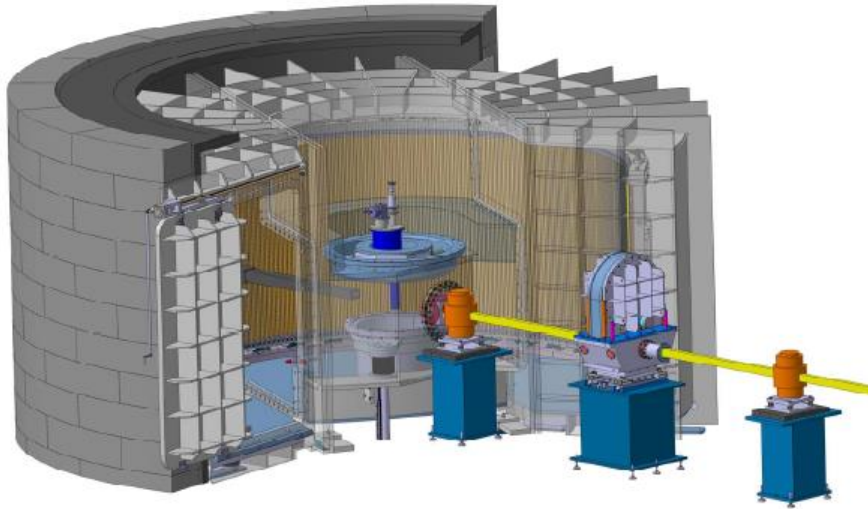
Scientific Computing Group



BornAgain GISAS software
MANTID event-mode TOF software

METHOD AND INSTRUMENT DEVELOPMENT AND CONSTRUCTION

Know-how makes you attractive for neutron source operators

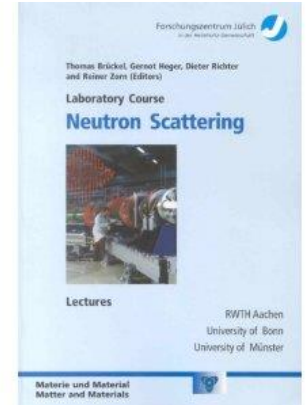


... in close collaboration with the
Central Institute for Engineering, Electronics and Analytics (ZEA)

EDUCATION OF THE NEXT GENERATION OF NEUTRON SCIENTISTS

An important aspect for a user facility!

- >250 applicants
- 55 participants
- lectures in Jülich
- practical part at 12 instruments in Garching
- lecture notes & instructions manual



DEVELOPMENT OF THE NEXT GENERATION OF NEUTRON SOURCES

An own neutron source puts you back into the driver seat!

➤ **A: low frequency target station:**

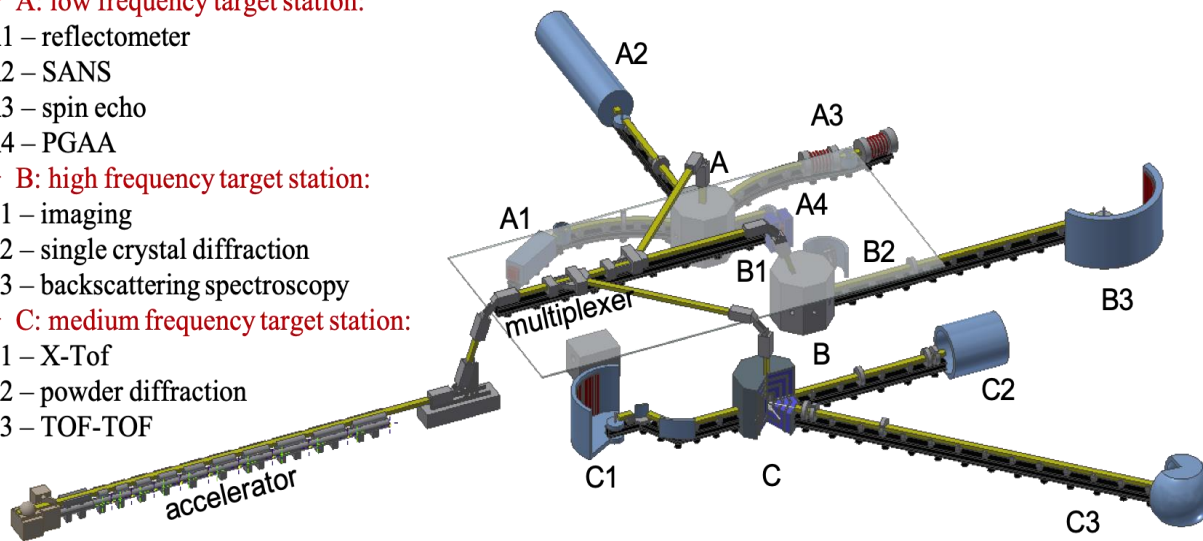
- A1 – reflectometer
- A2 – SANS
- A3 – spin echo
- A4 – PGAA

➤ **B: high frequency target station:**

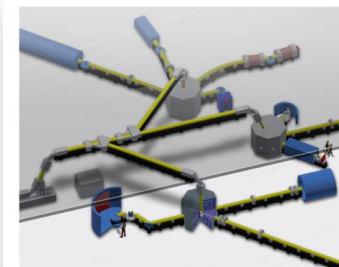
- B1 – imaging
- B2 – single crystal diffraction
- B3 – backscattering spectroscopy

➤ **C: medium frequency target station:**

- C1 – X-ToF
- C2 – powder diffraction
- C3 – TOF-TOF



Compact Accelerator driven Neutron Sources CANS



Conceptual Design Report
Jülich High Brilliance Neutron Source (J-HBS)

Schlüsseltechnologien / Key Technologies
Band / Volume
ISBN 978-3-96506-270-2

Mitglied der Helmholtz-Gemeinschaft

JÜLICH
Forschungszentrum

Jülich High-Brilliance neutron Source project HBS

T. Brückel, T. Gutberlet (Eds.)

Schriften des Forschungszentrum Jülich, General, Vol.8 (2020)

SOME LESSONS LEARNED: WHAT WORKED FOR JCNS

Success through a clear strategy

- ✓ a clear strategy: “best instruments at best sources”
- ✓ modern beam extraction and beam optics beats bare flux in the moderator:
FMR II / DIDO: factor 3; instruments: > factor 10
- ✓ a distributed facility is less vulnerable to “black outs”;
but someone else has the saying in source operation
- ✓ expertise in neutron methods and instruments is crucial: makes one attractive to
source operators, allows one to use instruments at its best
- ✓ own instruments as “in-kind contribution”
- ✓ a main “hub” is needed for user recruitment and education
and cooperation with industry

SOME LESSONS LEARNED: WHAT WORKED FOR JCNS

Success through a clear strategy

- ✓ with a team on site one can make best usage of the partner facility
- ✓ one needs clear measures to keep strong connections to these teams
- ✓ one has to balance scientific integration of this team at the facility while keeping scientific contact to the home base
- ✓ one has to work much harder to make ones scientific breakthroughs acknowledged
- ✓ with shrinking supply of neutrons and others following the JCNS model (Geesthacht, LLB, IET Norway) the possibilities of partnerships become very limited. New sources are needed.
- ✓ on the long run we strive to get our own facility “to be in the driver seat”