

**Nuclear Physics Institute (NPI),  
Řež near Prague, Czech Republic**



**Neutron Physics Laboratory**

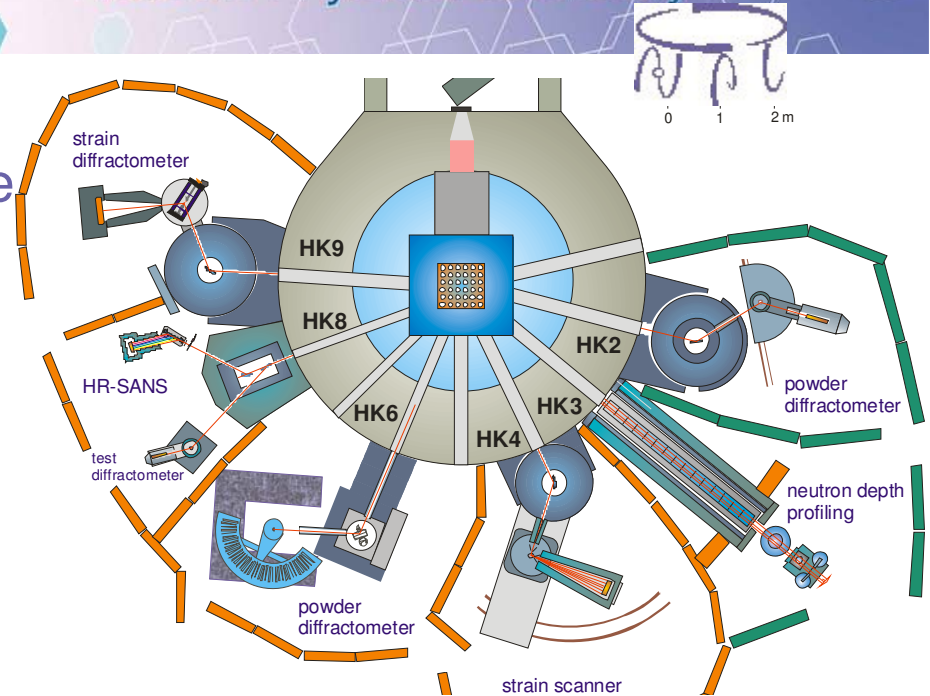


ACCESS Activity presentation  
by Pavel Strunz  
General Assembly, PSI Villigen, CH  
March 31, 2009

<http://neutron.ujf.cas.cz/CFANR/access.html>

## NPL highlights

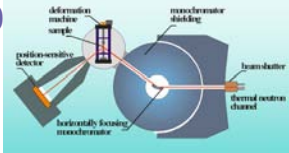
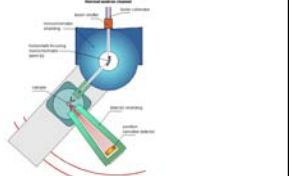
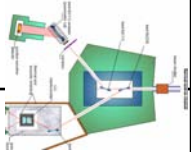

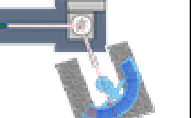
- NPL: small lab compared to the large neutron-physics centers => => focus on couple of fields where unique facilities can be provided
- Access: 8 facilities
  - 3 nuclear-analytical techniques
  - 5 diffraction techniques



<p>T-NDP</p>	<p>Neutron Depth Profiling: non-destructive analysis of concentration profiles of light elements (diffusion, sputtering, corrosion, electronics, optronics, life sciences)</p>
<p>NAA</p>	<p>Neutron Activation Analysis: low-level elemental characterization - biology, biomedicine, environment, geology, metallurgy</p>
<p>NG</p>	<p>Thermal neutron facility for study of <math>\gamma</math>-<math>\gamma</math> coincidences from (n,<math>\gamma</math>) reactions: photon-strength functions, nuclear structure</p>



## NPL highlights: diffraction

<p>TKSN-400</p> 	<p>High-resolution diffractometer: macro- and microstrains in polycrystals, in-situ, thermo-mechanical processing, phase transformations in steels, SMA etc.</p>
<p>SPN-100</p> 	<p>Diffractometer for macrostrain scanning of polycrystalline materials (welds)</p>
<p>MAUD (formerly DN-2)</p> 	<p>Double crystal small-angle neutron scattering: microstructural studies (precipitation in alloys, porosity in ceramics) – <b>currently being upgraded</b></p>
<p>TEXDIF</p> 	<p>Texture diffractometer, also used for neutron optics tests – <b>currently being upgraded</b></p>
<p>MEREDIT</p> 	<p><b>New:</b> Medium resolution powder diffractometer: standard diffraction experiments with sophisticated sample environment (e.g. deformation +<b>B</b>)</p>

- Diffraction: MEREDIT (**new**), upgrade MAUD, TEXDIF
- Neutron optics based on bent Si
- In-situ deformation experiments at high resolution



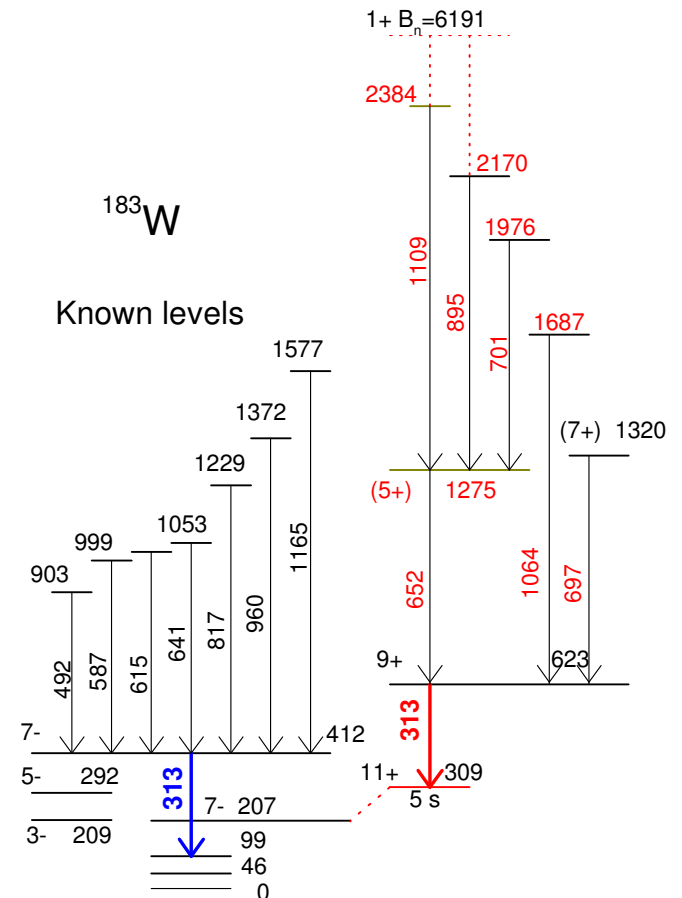
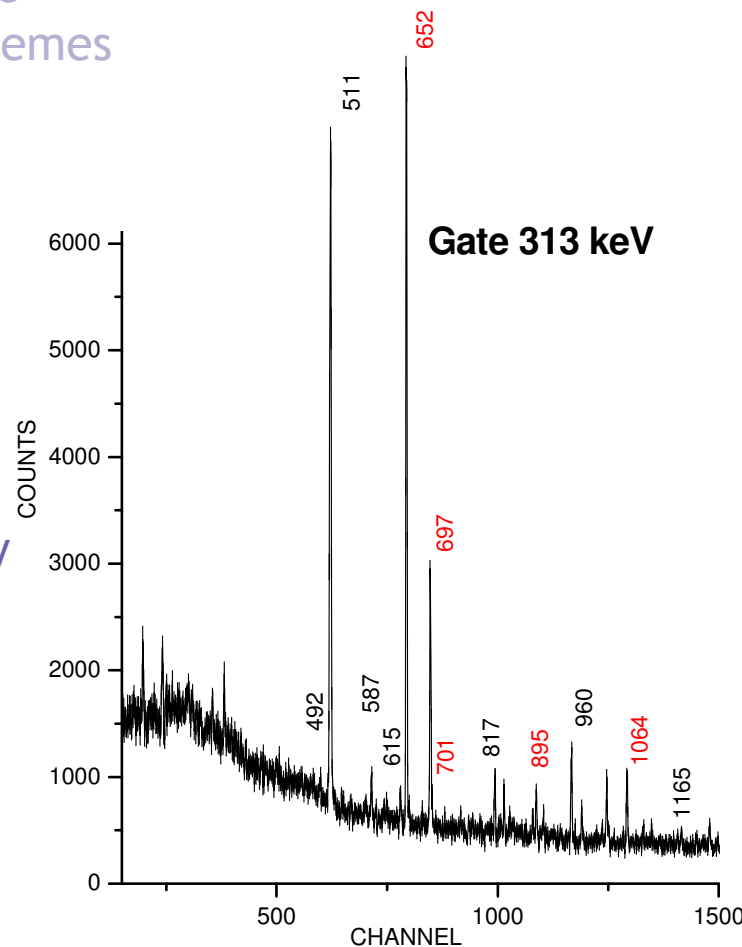
# Nuclear structure through (n, $\gamma$ ) reaction

V. Bondarenko, University of Latvia

- gamma coincidence => complex decay schemes



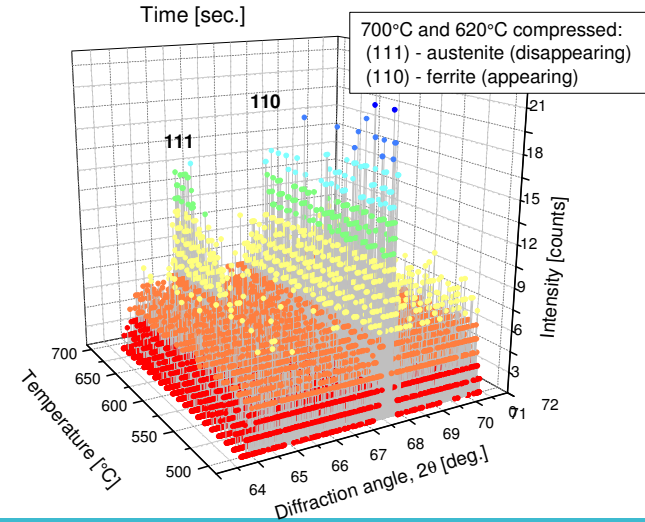
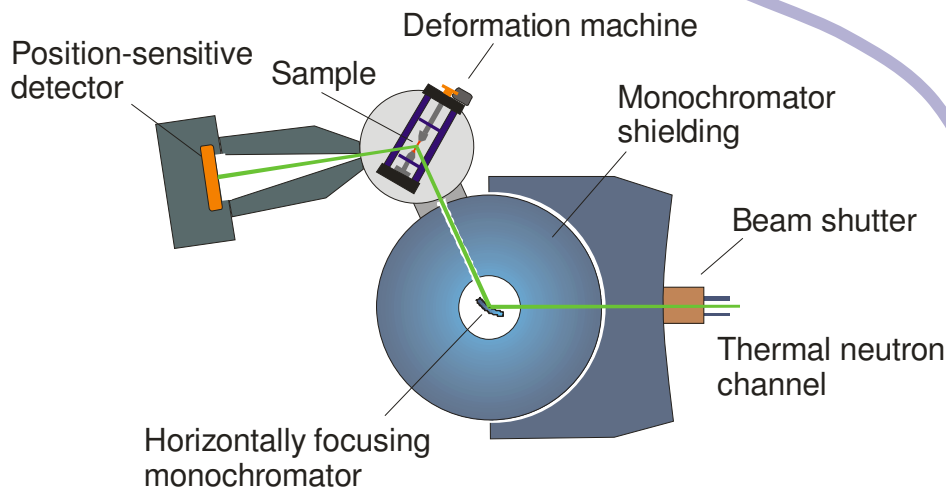
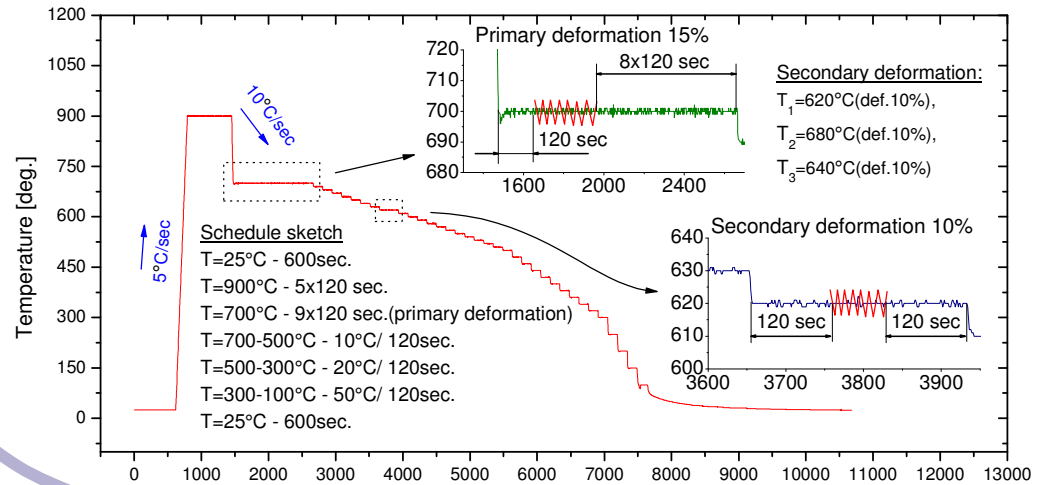
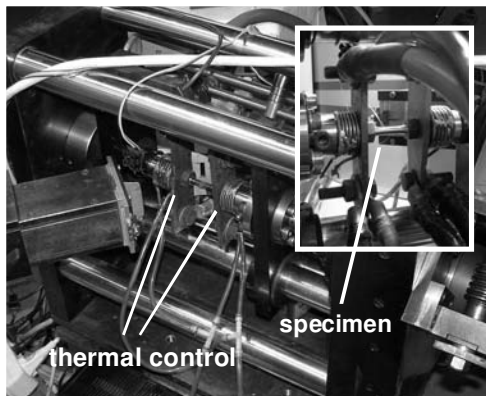
- doublet 313 keV - unresolved without coincidence
- new branch in decay scheme disclosed
- new levels: red





■ In-situ experiments at high resolution during thermomechanical treatment

■ Example: austenite-to-ferrite transformation in Fe-Mn-C alloys





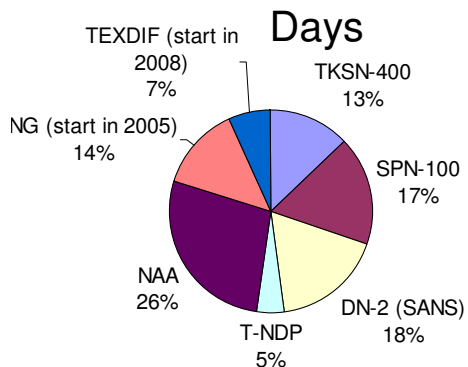
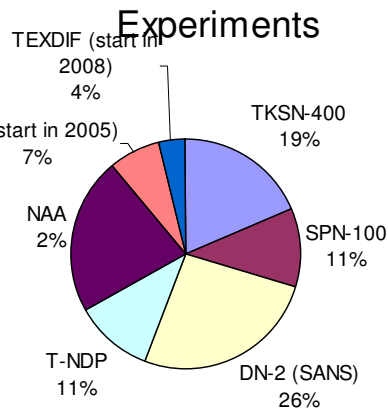
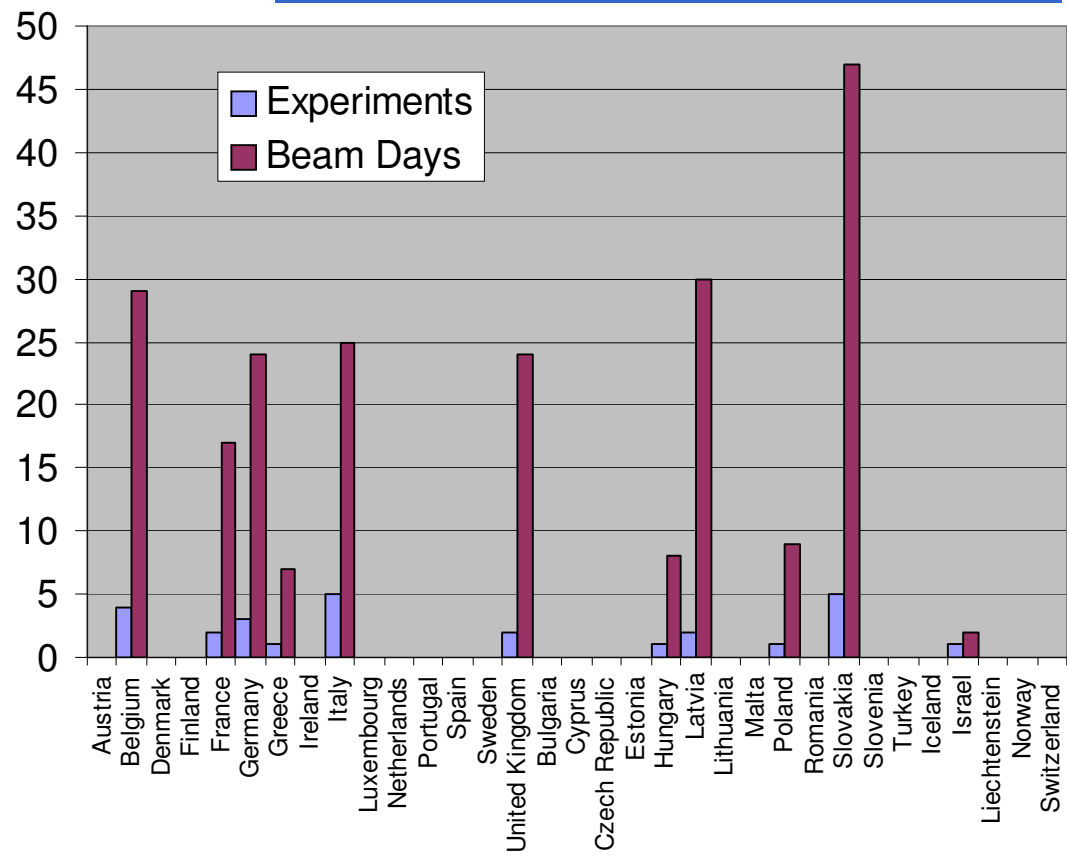
# NMI3 – FP6 experiments: statistics

04/2004-06/2008

## Access beamtime (facility distribution)

Distribution among facilities	Experiments	Days
TKSN-400	5	29
SPN-100	3	38
DN-2 (SANS)	7	39
T-NDP	3	10
NAA	6	61
NG (start in 2005)	2	30
TEXDIF (start in 2008)	1	15
<b>sum</b>	<b>26</b>	<b>222</b>

## Country of proposal origin (accepted and carried out)



## Place in Europe

- Statistics on user frequentation / outcome
  - NMI3 in FP6:
    - 26 experiments, 222 beamdays
    - 52 days per year
  - Publications
    - 16 papers
    - 1 PhD thesis
    - 14 oral presentation at conferences and workshops
  
- Techniques not frequently offered at other research centres
  - elemental analytical techniques (NAA, T-NDP)
  - basic nuclear physics facility (NG)
  - high-resolution SANS (MAUD)
  - high-resolution diffraction in connection with in-situ thermo-mechanical tests

## Strategy for the future

- Is there a possibility to reinforce the strength of the facility through a common strategy?
  - Software: the same data formats?
  - Data evaluation software administration (no local capacity to deal with user data – common tool for helping to find and run the proper software)?
- Would a topical focus make sense ?
  - Topics is facility dependent: they are solving sometimes very different tasks
  - To keep the same amount of Access: several parallel Accesses focused on several topics would be necessary to run. Otherwise: Access for certain facilities only.
  - Additional integration potential - low
- Point of view regarding integration with other fields (eg. laser)
  - No common topics with laser at our lab
  - Perhaps with synchrotron, but ...