

## Commissioning of the Cold Source at the FRM-II

E. Gutmiedl<sup>1</sup>, D. Pätke<sup>1</sup>, K. Zeitelhack<sup>1</sup>, F. Grünauer<sup>1</sup>, A. Scheuer<sup>3</sup> and A. Schölderle<sup>2</sup>

<sup>1</sup> Technische Universität München, ZWE FRM-II, D-85747 Garching, Germany ;

<sup>2</sup> LINDE, D-82049 Höllrigelskreuth, Germany;

<sup>3</sup> TÜV Rheinland, Köln, Germany

During the year 2004 the new research reactor FRM-II of the Technical University of Munich was successfully tested in regards of cold an hot commissioning.

One major FRM-II component for producing cold neutrons for many different experiments is the cold neutron source (cns) [1].

The cns of the FRM-II is a liquid deuterium source, which is favorable to feed many neutron guides for cold neutron experiments.

The liquid deuterium (~ 2.4 kg) is kept on the boiling point at full reactor power. Thermal neutrons are moderated to lower energies by the cold boiling liquid.



Figure 1: In-Pool assembly of cns

In 2003 and early 2004 all auxiliary systems (cooling machine, metal hydride deuterium

storage system, vacuum system) have been tested successfully during the cold commissioning phase.

From March 2004 to October 2004, the cns was tested together with the FRM-II reactor at different nuclear power steps (0 – 20 MWatt).

The control logic of the cooling machine (max. cooling power 5 kWatt at 25 K) was optimized to follow every power transients of the FRM-II reactor ( power changes and fast shut down).

In Autumn 2004 the cns performance of producing cold neutrons was determined by measuring the spectral cold neutron flux of the cns through the beam channel SR4.

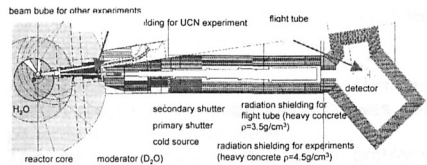


Figure 2: Setup of spectral cold neutron flux measurement

Vergleich von Spektren der kalten Quelle, die aus Monte Carlo-Rechnungen und TOF-Messung bestimmt wurden (Abstand zu Kern 4m)

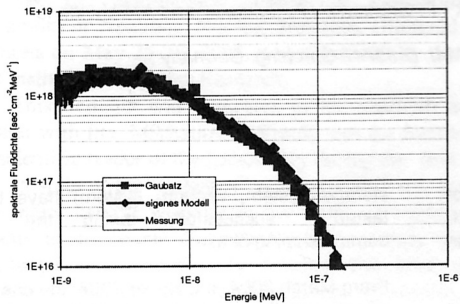


Figure 3: Spectral cold neutron flux; measurement and MCNP calculations

The measured cold neutron flux of the cns agrees quite well with the results of Monte Carlo calculations of the cns.

#### References

- [1] K. Gobrecht, E. Gutsmedl, A. Scheuer; Status report on the cold neutron source of the Garching neutron research facility FRM-II, Physica B 311 (2002), 148-151