

THERMAL NEUTRON CONVERTER FOR IRRADIATIONS WITH FISSION NEUTRONS

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The new research reactor FRM II at Garching started operation in March 2004. The compact core is cooled by light water, and moderated by heavy water. Two fuel plates mounted in the heavy water tank convert thermal to fast neutrons. The fast neutron flux in the connected beam tube is up to $7 \cdot 10^8 \text{ s}^{-1}\text{cm}^{-2}$ (depending on filters and collimation); the mean neutron energy is about 1.6 MeV. There are two irradiation rooms along the beam. The first is mainly used for medical therapy (MEDAPP facility), the second for materials characterization (NECTAR facility). At the former therapy facility RENT at the old research reactor FRM, the same beam quality was available until July 2000. Therefore, only a small program is run for the determination of the biological effectiveness of the new beam. The neutron and gamma dose rates in the medical beam are 0.54 and 0.20 Gy/min, respectively. The therapy facility MEDAPP is still under examination according to European regulations for medical devices. Full medical operation will start in 2007. The radiography and tomography facility NECTAR is in operation and aims at non-destructive inspection of objects up to 400 kg mass and $80 \times 80 \times 80 \text{ cm}^3$ in size. As for fission neutrons the macroscopic cross section of hydrogen is much higher than for other materials (e. g. Fe and Pb), one special application is the detection of hydrogen-containing materials (e. g. oil) in dense materials.