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Neutron Irradiation Capabilities at the PTB Ion Accelerator Facility PIAF

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At the accelerator facility PIAF of Physikalisch-Technische Bundesanstalt (PTB), proton and deuteron beams are used to produce monoenergetic neutron fields in open geometry (full solid angle) in a low scatter hall using various nuclear reactions. The energy range of the monoenergetic neutron fields ranges from 140 keV to 19 MeV with a gap between 8 MeV and 14 MeV where no monoenergetic neutron source exists. The flux densities range between $5 \cdot 10^4 \text{ cm}^{-2}\text{s}^{-1}$ and $2 \cdot 10^6 \text{ cm}^{-2}\text{s}^{-1}$ at 10 cm from the production target which makes these fields suitable for testing the energy dependence of radiation effects in microelectronic components. The monoenergetic fields are complemented by 'white' collimated high-intensity beams with a maximum neutron energy of about 17 MeV and flux densities up to $1 \cdot 10^8 \text{ cm}^{-2}\text{s}^{-1}$ are achieved. Other radiation sources available at the PTB comprise an ion microprobe with proton and alpha beams and a 50 MeV electron linac with bremsstrahlung and electron beams. Access to neutron beams up to 200 MeV is possible via a collaboration with iThemba LABS in Cape Town.

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