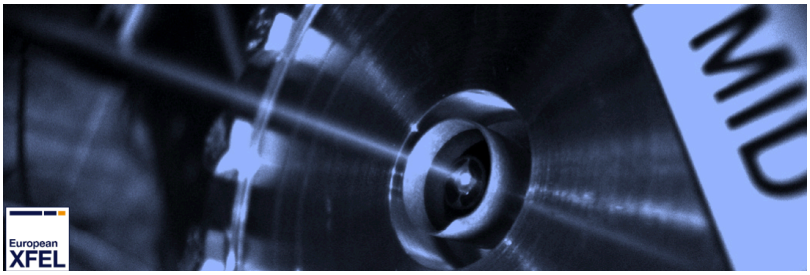

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Scientific Opportunities with High-Energy Mössbauer Transitions

Thursday 19 January 2023 14:45 (20 minutes)

Since its inception in 1985 by Gerdau and coworkers at the storage ring DORIS (DESY, Hamburg), the excitation of Mössbauer transitions with x-rays from accelerator-driven sources became a widely used technique in many scientific disciplines at hard-x-ray synchrotrons worldwide, and recently also at XFEL sources.

So far, however, the method was focussed on Mössbauer isotopes with transition energies below 40 keV, mainly due to limited spectral flux at existing synchrotron radiation sources and the reduced time-resolved detection efficiency at high x-ray energies.

Notwithstanding of these circumstance there are a multitude of Mössbauer isotopes with resonance energies above 40 keV that are scientifically highly interesting. Examples are ^{61}Ni at 67 keV for its relevance in biological functions and ^{193}Ir at 73 keV for its role in correlated materials, to name a few.

The availability of XFEL radiation at these energies would open new scientific opportunities, of which I will illuminate some interesting applications in this presentation.

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