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Compton and Thomson inverse scattering as an X-ray source: state of the art and perspectives

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Compton backscattering is the most promising instrument of radiation generation in the X-ray range. Comparing with modern 4-th generation facilities, Compton sources offer very important for the research laboratories advantages –relative compactness and cheapness, while the main characteristics (number of photons per pulse, energy bandwidth, pulse duration, emittance etc.) can be sufficient for applications in phase contrast and K-edge imaging, cancer therapy, computed tomography and so on. In the present report we give a short review of current state of development of such sources. We discuss the theoretical approach describing the interaction of electron beams with electromagnetic waves, advantages and disadvantages of linear and nonlinear regimes, coherent effects, polarization, as well as the progress and problems in experimental realization.

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