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# Generation of intense radiation over the entire spectrum from intense laser beam-plasma and particle beam interaction. Overview and applications

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High power laser beams emit in the near infrared regime. When such a laser interacts at relativistic intensity with high density targets and intense particle beams it emits coherent and incoherent electromagnetic radiation into an extremely wide spectral domain, to begin with intense Terahertz radiation from filamented dense plasmas, to continue with continuous black body and bremsstrahlung radiation, K alpha line radiation, high harmonic generation, induced Compton scattering, and to end with hard gamma production from laser-relativistic particle beam interaction via Doppler effect.
The significance is outlined by discussing possible applications to scanning and detection of Terahertz radiation, to equation of state studies of laser and thermal radiation induced compression of matter, to light scattering diagnostics of line radiation (backlighting), to high-field ion and nuclear interactions, and to fundamental studies in physics.
The aim of the survey is, last but not least, to clarify the FAIR related question: Does GSI need a powerful PHELIX upgrade long pulse/short pulse system?

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