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Soft X-Ray Coherent Bremsstrahlung Induced by Hypersonic Waves

We investigate the coherent bremsstrahlung of soft X-rays from 50 MeV electrons moving in a single crystal under the influence of hypersonic waves. The consideration is done for an arbitrary profile of the deformation field generated by the hypersound. The coherent effects dominate when the electron enters into the crystal at small angles with respect to a crystallographic axis. With dependence of the parameters, the hypersound can either enhance or reduce the bremsstrahlung cross-section. We show that the presence of the hypersound induces relatively strong peaks in the spectral distribution of the radiated photons in the range of soft X-rays. The numerical examples are given for the SiO₂ crystal with the deformation field generated by a transversal wave of the S-type.

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