X-ray Transition Radiation Produced by 2.8-GeV Electrons in a Multilayer Aluminum Target And Diffracted in a Silicon Crystal

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X-ray transition radiation (XTR) by relativistic charged particles is a promising tool for diagnostics of sub-micrometer size beams, required for future linear colliders. Also XTR can be used not only in accelerators. For example, in [1] XTR by 855 MeV electrons from a multilayer structure, diffracted in a Si plate, was investigated for the purpose of its application for X-ray phase contrast imaging. The use of a multilayer target increases the yield of transition radiation and a crystal allows extracting a narrow line with tunable energy from the continuous spectrum.

In the present work we study the XTR generated by 2.8-GeV electrons in a target of 32 Al foils with thickness of 13 um, diffracted on (111) plane of a Si crystal at the Bragg angle of 7.9 degrees, with the aim of applying it for the further study of its focusing by polycapillary X-ray optics. The XTR spectra are measured using Amptek XR-100SDD detector and contain a narrow peak with the energy of 14.4 keV. The study was performed at the Test Beam Facility TB21 of DESY [2]. The obtained results coincide well with the calculations.

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References

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