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Coherent radiation of relativistic electrons in metamaterials based on the SRR/wire-grid unit cell in millimeter wavelength range

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In this report we present experimental investigation of interaction of the electromagnetic field of a relativistic bunched electron beam with a metamaterial. Used metamaterial target represents a right triangular prism. The unit cell of the target consists of a split-ring resonator (SRR) and a wire. The size of the unit cell is 3 mm. The measurements were done in millimeter wavelength range in far field zone using relativistic electron beam with energy of 6 MeV. The measured angular dependencies show that the radiation generated by the electron bunches moving near the target is observed in the backward semi-sphere. In approximation of scalar refractive index the obtained result can be interpreted as the reversed Cherenkov radiation.

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