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Title:Theoretical investigation of a tunable free-electron light source

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Abstract:The concept and experimental results of a light source given in a recent paper by Adamo are very interesting and attractive. Our paper presents detailed theoretical investigations on such a light source, and our results confirm that the mechanism of the light radiation experimentally detected in the published paper is a special kind of diffraction radiation in a waveguide with nanoscale periodic structure excited by an electron beam. The numerical calculations based on our theory and digital simulations agree well with the experimental results. This mechanism of diffraction radiation is of significance in physics and optics, and may bring good opportunities for the generation of electromagnetic waves from terahertz to light frequency regimes. © 2011 American Physical Society.