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Beam dynamics in plasma-based accelerators including the effects of betatron radiation¹ PIERRE MICHEL, CARL B. SCHROEDER, BRADLEY A. SHADWICK, ERIC ESAREY, WIM P. LEEMANS, Lawrence Berkeley National laboratory — Spontaneous synchrotron radiation is emitted from relativistic electrons undergoing betatron motion in the focusing wakefields of a plasma-based accelerator. Significant beam energy can be radiated by this mechanism, typically in the hard x-ray domain with a broad spectrum. We present analytical and numerical results on the radiation spectrum and the dynamics of the strongly radiating beam undergoing betatron oscillations. Evolution of the electron beam phase space characteristics are investigated. Implications for the design of a laser-plasma- based accelerator are considered.

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