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Chromatic matching in a plasma undulator[1] BLAGOJE DJORDJEVIC, University of California, Berkeley, CARLO BENEDETTI, CARL SCHROEDER, ERIC ESAREY, Lawrence Berkeley National Laboratory — The principle of color tuning, using two laser modes of different geometric modes numbers and of different colors such that they copropagate at the same group velocity, is proposed in order to realize the plasma undulator concept. By using color tuning it is possible to overcome the limit of group velocity slippage, whereby lower order modes outrun higher order ones, allowing for extended interaction lengths. The dephasing limit can be overcome by using a particular tapering of the plasma channel such that the electron bunch propagates in phase with the laser mode as well as maintain constant undulator frequency. In addition, controlled dephasing is proposed as a means to induce a chirp in the generated x-ray spectrum.

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