

195. Title: Improved ramped bunch train to increase the transformer ratio of a two-channel multimode dielectric wakefield accelerator

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Source: PHYSICAL REVIEW SPECIAL TOPICS-ACCELERATORS AND BEAMS

Volume:14

Issue:3

Pages 031302

Publication year: 2011

Document type:Journal article (JA)

Abstract: Here we show a possibility of applying the ramped drive bunch train (RBT) technique to a two-channel coaxial dielectric wakefield accelerator (CDWA). For numerical research we study a 28 GHz structure with two nested alumina cylindrical shells having these diameters: outer shell, OD = 28.1 mm, ID = 27 mm; inner shell, OD = 6.35 mm, ID = 4.0 mm. The structure is to be excited by a train of four annular bunches having energy 14 MeV and axial rms length 1 mm; the total charge of bunches is 200 nC. In the case of equally charged drive bunches, spaced apart by the principal wakefield wavelength 10.67 mm, we obtained transformer ratio $T = 3.4$. If the bunch charge is increasing as the ratio 1:3:5:7 and the bunches are spaced by one and one-half wavelengths, we obtained $T = 3.8$. We found that if the charge ratios are 1.0:2.4:3.5:5.0 and the spaces between the bunches are 2.5, 2.5, and 4.5 wakefield periods, then T increases strongly, T similar to 20. The RBT also can be used successfully in a high gradient THz CDWA structure. A particle-in-cell simulation shows that the four drive bunches can move without appreciable distortion.