

DPP12-2012-000020

Abstract for an Invited Paper
for the DPP12 Meeting of
the American Physical Society

Ping-Pong Modes and Higher-Periodicity Multipactor¹

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Multipactor is a vacuum discharge based on secondary electron emission. Multiple period multipactors have long been known to exist but have been studied less extensively. In a period- n multipactor, electrons undergo multiple impacts in one rf period, with the synchronous phase alternating periodically between multiple values. A novel resonant form is proposed that combines one- and two-surface impacts within a single period, provided the total transit time is an odd number of rf half-periods, and the product of secondary yields exceeds unity. For low fD products, the simplest such mode is shown to significantly increase the upper electric field boundary of the multipacting region, and lead to overlap of higher-order bands. The results agree nicely with 3-D particle-in-cell code simulations. Practical implications of the findings are discussed, including consequences for multipactor suppression strategies using a DC magnetic field.

¹Supported by the US Dept. of Energy, Office of Science, High Energy Physics.