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Review theories and experiments of improving HPM window breakdown thresholds

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Dielectric window breakdown is a seriously confronting challenge in HPM transmission and radiation. Breakdown at the vacuum/dielectric interface is triggered by multipactor and finally realized by plasma avalanche in the ambient desorbed or evaporated gas layer above the dielectric [1-4]. The methods of improving breakdown thresholds become key issues of HPM system. We review the main theoretical and experimental progress, and then, we further survey the mechanisms of multipactor suppression of the periodic rectangular [5] and triangular surface profiles [6-8] by dynamic analysis and particle-in-cell simulations, and the demonstration of improving HPM thresholds by proof-of-principle experiments and multi-GW experiments. We also synthesize the theory of using magnetic field [9] to suppress multipactor.

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[2] C. Chang, et al., POP 16, 033505, 2009.
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[5] C. Chang, et al., JAP 105, 123305, 2009.
[6] C. Chang, et al., POP 16, 083501, 2009.
[7] C. Chang, et al., LPB 28, 185, 2010.
[8] C. Chang, et al., PIER 101,157, 2010.
[9] C. Chang, et al., APL 96, 111502, 2010.