

**DECONSTRUCTING IONIZATION AND  
SCATTERING EFFECTS IN CROSSED-FIELD  
DIODES**

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The presence of plasma has long been suspected to be a major cause of gap closure in high power crossed-field diodes and HPM sources, even under the condition of magnetic insulation. Previous work [1] shows that the presence of fixed ions anywhere in the diode gap increases penetration of the electron hub height into the gap. Further work shows that [2] mobile ions exacerbate this effect causing gap closure on time scales comparable to desired pulse lengths. We use PIC simulations in an attempt to electrostatically decouple some of the basic physics of electron scattering and ionization in order to determine in which pressure regimes a particular hub-height expansion mechanism dominates.

1. Y. Y. Lau, J. W. Luginsland, K. L. Cartwright and M. D. Haworth, "Role of Ions in a Crossed-Field Diode", *Phys. Rev. Lett.*, 98, 2007.

2. B. S. Stutzman and J. W. Luginsland, "Role of Ions in a Crossed-Field Diode II: Ionization Effects", *IEEE Trans. Plasma Sci.*, under review.

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