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Electron beam propagation in insulator: the effects of polarization current caused by electric field ionization BORIS FROLOV, UCSD, ANDREAS KEMP, UNR, SERGEI KRASHENINNIKOV, UCSD, TOM COWAN, UNR — Experimental data show a strong filamentation of intense electron beam propagating through insulators [1] while the beam remains rather smooth propagating though conductors. A very strong electric field formed at the beam's head in an insulator, which causes its ionization due to tunneling effects. In Ref. 2 it was shown that the instability of the ionization front caused by the electric field ionization process might be the reason of such filamentation. However, in Ref. 2 the effects of the polarization current associated with the electric field ionization was not accounted for, while they may be important. Here we present the results of the study of these effects on the structure and stability of the ionization front. We also perform the scoping study of the impact of the parameters characterizing the insulator material on the ionization front speed. [1] L. Gremillet, et al., PRL 83, 5015 (1999), J. Fuchs, et al., PRL 91, 255002 (2003), R.B. Stephens, et al., PR E 69, 066414 (2004). ; [2] S. I. Krasheninnikov, A. V. Kim, B. K. Frolov, and R. Stephens, PoP, July (2005)

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