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Instability of the ionization front during intense electron beam propagation through insulators S.I. KRASHENINNIKOV, UCSD, A.V. KIM, IAP RAS (Russia), B.K. FROLOV, UCSD, R.B. STEPHENS, GA — Recent experimental investigations reveal a striking difference in the propagation of intense electron beams through metals and insulators. While in metals electron beam remains spatially uniform even after penetration through rather thick foil, the propagation of the beam through an insulator results in spatial filamentation of initially uniform beam and it happens at rather short distance from the surface of the foil. Both analytical and numerical analysis of intense electron beam propagation through an insulator show that in addition to binary ionization of neutrals, the electric field ionization process plays an important role in the neutralization of beam charge/current. Here we show that 1D ionization front in insulator is unstable. We identify long and short wavelength unstable modes both of which are associated with an impact of the electric field ionization process. We estimate the growth rate of these modes and compare our theoretical prediction with available experimental data.

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