

Abstract Submitted
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Generation of electron and ion beams in X pinches.¹ Y.S. DIMANT, Boston University, T.A. SHELKOVENKO, S.A. PIKUZ, D.A. HAMMER, Cornell University — X pinches employed for x-ray generation represent excellent objects to study the details of plasma pinch processes. An X pinch is produced by passing a high current through two or more metal wires that cross and touch at a single point in the middle. During its evolution, the X-pinch forms in the middle a small Z pinch that is unstable and forms a cascade of smaller and denser necks. In the final phase, the pinch disrupts and produces extremely short and localized bursts of intense soft x-ray radiation, followed immediately by a ~ 1 ns burst of higher energy x-rays that is attributed to energetic electrons accelerated in the gaps that appear in the X-pinch plasma structure after its soft x-ray burst. The behavior of the energetic particles that produce intense x-rays requires a kinetic description. Using a simplified kinetic approach and available results of recent MHD simulations, we will discuss the dynamics of energetic electron and ion beams formed around the central axis of the X-pinch, where the magnetic field does not prevent kinetic runaway in the applied strong electric field. Recent measurements of the cross-wire voltage and beam currents allow us to more accurately compare our theoretical estimates with observations.

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