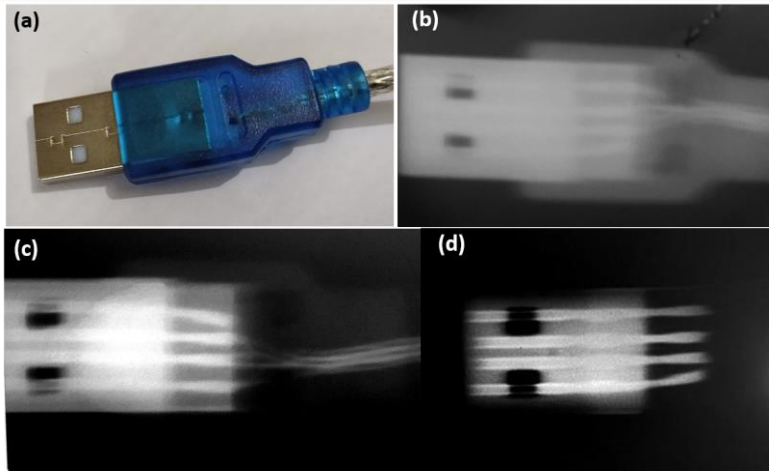
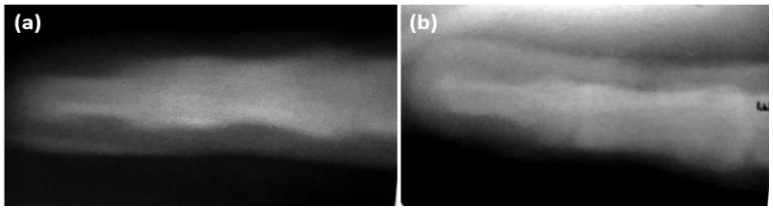
Effect of Positive Polarity in an Inertial Electrostatic Confinement Fusion Device: Electron Confinement, X-Ray Production, and Radiography

Darpan Bhattacharjee, Smruti Ranjan Mohanty and Sayan Adhikari



X-ray radiography of a USB plug: (a) the actual photograph, and radiography images at (b) 25 kV, (c) 35 kV, and (d) 45 kV applied voltages



Radiography image of a human's little finger using different anode geometry (a) cylindrical grid (b) solid rod

This research explores the Inertial Electrostatic Confinement Fusion (IECF) device's novel application as a compact and versatile X-ray source for radiography, in addition to its traditional use for neutron generation. Reversing the polarity of the central grid alters particle dynamics within the device, redirecting electrons towards the central anode and producing continuous bremsstrahlung radiation. Successful X-ray imaging of both metallic and biological samples demonstrates potential for broader utilization in diverse fields, including enhanced security systems that leverage the IECF's dual neutron and X-ray scanning capabilities.

Fusion Science and Technology, Vol. 79, 671-682, August 2023
https://doi.org/10.1080/15361055.2023.2176690