Narrow electron beam production and transmission properties with glass capillaries

BUDDHIKA DASSANAYAKE, JOHN TANIS, ASMA AYYAD, Western Michigan University, Kalamazoo, MI, 49009 — Transmission of 300-1000 eV electrons through a single cylindrically-shaped glass capillary of Borosilicate glass was studied [1,2]. The capillary had a diameter of \( \sim 0.20 \) mm and a length of \( \sim 15 \) mm. Transmitted electron intensities revealed three distinct regions with different characteristics: (1) for sample tilt angles (with respect to incident beam) less than \( 1^\circ \) the transmission was dominated by the direct beam (no interactions with inner capillary wall), (2) for tilt angles between \( 1^\circ \) and \( \sim 3.5^\circ \) the majority of transmission was due to Coulombic repulsion by charge deposition at the capillary entrance, and (3) for tilt angles larger than \( 3.5^\circ \) transmission was governed by inelastic scattering and as a result lost energy. Energy dependence and time evolution studies were carried out to seek more insight into the transmission process.