Electronic Structure of Liquid Mercury Using Compton Scattering Technique

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The isotropic Compton profile of mercury has been measured, using 661.65 keV gamma-rays from a 20 Ci ^{137}Cs source. To extract the true experimental Compton line shape, besides the usual systematic corrections we have incorporated for the first time the background correction due to bremsstrahlung radiation generated by photo and Compton electrons. Theoretical computations have been carried out, using the renormalised-free-atom (RFA) for the electron configuration $4f^{14}5d^{10}6s^2$ and free electron models. It is found that the present experimental data with bremsstrahlung background correction are in better agreement with the RFA calculations. This work suggests the incorporation of the bremsstrahlung background correction in Compton scattering experiments of heavy materials using high-energy gamma-ray sources.

Key words: Electronic Structure; Compton Scattering; Electron Momentum Density; Mercury Metal.