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Spectroscopic study of EUV and SXR transitions of Cu XIX with plasma parameters

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Extensive and elaborate theoretical computations of Cu XIX have been performed by employing Multi-Configuration Dirac-Fock (MCDF) method. We have presented energy levels and radiative data such as, transition wavelengths, radiative rates, oscillator strengths and line strengths for electric dipole (E1) transitions in Na-like Cu. For other types of transitions, namely magnetic dipole (M1), electric quadrupole (E2) and magnetic quadrupole (M2), only the A-values are listed. We have also discussed the importance and the effect of Valence-Valence (VV) and Core-Valence (CV) correlations on the excitation energies in graphical as well as in tabular form. The accuracies of the presented levels, wavelengths, transition rates and lifetimes are assessed by comparing them to available experimental and other theoretical results. Analogous calculations have been carried out by using Flexible Atomic Code (FAC) based on self-consistent Dirac-Fock-Slater iteration method. QED corrections due to vacuum polarization and self-energy effects and Breit correction due to the exchange of virtual photons between two electrons are fully considered and their effects on the energy levels are studied graphically. The fine-structure energy levels have also been reported by using the Configuration Interaction (CIV3) technique. An inter-comparison among three independent calculations helps us in assessing the credibility and integrity of our reported data. Additionally, we have shown the variation of the line intensity ratios and electron density with plasma temperature graphically for Cu XIX. We have also identified Extreme Ultraviolet (EUV) and Soft X-ray (SXR) transitions and believe that our reported results may be beneficial in space and laboratory plasma research.

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