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Shannon entropies and Fisher information of K-shell electrons of neutral atoms

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We represent the two K-shell electrons of neutral atoms by Hylleraas-type wave function which fulfills the exact behavior at the electron–electron and electron-nucleus coalescence points and derive a simple method to construct expressions for single-particle position and momentum-space charge densities, $\rho(r)$ and $\gamma(p)$ respectively. We use the results for $\rho(r)$ and $\gamma(p)$ to critically examine the effect of correlation on bare (uncorrelated) values of Shannon information entropies (S) and of Fisher information (F) for the K-shell electrons of atoms from helium to neon. Due to inter-electronic repulsion, the values of the uncorrelated Shannon position-space entropies are augmented while those of the momentum-space entropies are reduced. The corresponding Fisher information is found to exhibit opposite behavior with respect to this. Attempts are made to provide some plausible explanations for the observed response of S and F to electronic correlation.

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Evaluation of global solar radiation with single and multiple parameter models in midwestern region Jumla, Nepal

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This study is focused on the performance of four multiple-parameters models for the estimation of global solar radiation in Midwestern, Jumla Nepal located at latitude of 29.270 N, longitude of 82.190 E and at an elevation of 2,347 m from mean sea level. The study is carried for year 2011 and 2012. The performance of models was evaluated on the basis of Root Mean Square Error RMSE, Mean Bias Error MBE, Mean Percentage error PME and coefficient of determination (R²). Based on the statistical error indices obtained, Swarthman- Ogunide model was found to perform best in terms of accuracy with least RMSE value and highest coefficient of determination, R² value for the location. Thus, the Swarthman - Ogunide model is suitable for estimating global solar radiation in the Midwestern, Jumla Nepal and other locations with similar geographical and climatic conditions. Also, from regression technique and statistical analysis it is found that sunshine based modified Angstrom-PreScott model showed the best results in terms of empirical coefficients a and b are 0.41, 0.34 and 0.35, 0.46 respectively.

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