Abstract Submitted
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Quantification of entanglement entropies in two-electron atomic systems by the Schmidt-Slater decomposition method[1] CHIEN-HAO LIN, National Taiwan University, YEW KAM HO, Institute of Atomic and Molecular Sciences — We have carried out an investigation of the linear entropy and the von Neumann entropy for spatial (electron-electron orbital) entanglement for the two spin-1/2 fermions (electrons) in helium-like atomic systems. Hylleraas-type wave functions, in which the inter-electronic terms are included to take into account of correlation effects, are used to represent the ground and excited states of the two-electron wave functions with different nucleus charges. To quantify the entanglement entropies, we utilize the partial wave expansion procedure on the correlated Hylleraas functions, and employ the Schmidt-Slater decomposition method (see [1], and the references therein) to extract the eigenvalues for the one-particle reduced density matrix, from which the entropies can be determined. Our present results for linear entropy have shown good agreement with other available calculations using different methods [2, 3]. We will present our new results for the von Neumann entropy at the meeting.

[1] Kościk, P. *Phys. Lett. A* **377**, 2393 (2013);
[2] Lin, Y.-C., Lin, C.-Y., and Ho, Y. K., *Phys. Rev. A* **87**, 022316 (2013);
[3] Lin, C.-H., Lin, Y.-C. and Ho, Y. K., *Few-Body Syst.* **54**, 2147 (2013).

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