

Generalized Heisenberg uncertainty relation in spherical coordinates

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Following to the Weil method, we generalize the Heisenberg–Robertson uncertainty relation or arbitrary two operators. Consideration is made in spherical coordinates, where the distant variable r is restricted from one side $0 < r < \infty$. By this reason, accounting of suitable boundary condition at the origin for radial wavefunctions and operators is necessary. Therefore, there arise extra surface terms in comparison with traditional approaches. These extra terms are calculated for various solvable potentials and their influence is investigated. At last, the time–energy uncertainty relations are also analyzed. Some differences between our approach and that, in which a direct product for separate variances were considered, are discussed [1].

References

- [1] A.Khelashvili and T.Nadareishvili; Generalized Heisenberg uncertainty relation in spherical coordinates. International Journal of Modern Physics B., **36**, (2022),2250072;