# A. M. Cetto, L. de la Peña, A. Valdés-Hernández

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**Ana María Cetto**, Luis de la Peña, Andrea Valdés-Hernández
*Univ. Nacional Autónoma de México, MX*

## Two-electron system correlated by the zero-point field: physical explanation for the spin-statistics connection

Which is the physical agent behind the electronic structure of atoms and the antisymmetry of the electron state vectors?
With the purpose to find an answer to this key question, we analyze the possible stationary states of a system of noninteracting particles, using the tools of stochastic electrodynamics. In previous work, the resonant response of two particles to common modes of the random zero-point field has been shown to lead to the nonfactorizability of the composite state vector. Here we extend the analysis to a system of two atomic electrons with spin. For the electrons to constitute a single system, a correlation must be established between their dynamical variables. This happens in particular if common zero-point field modes link either the orbital or the spin states (or both). For such correlations to exist, the total (orbital plus spin) state vectors must be antisymmetric. States in which both electrons are in the same orbital and spinorial state, are excluded because of the absence of a correlating field mode. The corollary is that due consideration of the vacuum field in first quantization leads to the correct statistics for a system of electrons.

KW: Zero-point radiation field, foundations of quantum mechanics, stochastic electrodynamics, spin-statistics

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