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# The Effect of Lande G-Factors on the Quantum and Thermal Entanglement in the Mixed Spin-(1/2,S) Heisenberg Dimer

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**Abstract :** A rigorous analytical treatment, with the help of a concept of negativity, is used to study the quantum and thermal entanglement in an isotropic mixed spin-(1/2,S) Heisenberg dimer. The effect of the spin-S magnitude, as well as the effect of diversity between Landé g-factors of magnetic constituents on system entanglement, is exhaustively analyzed upon the variation of the external magnetic and electric field, respectively. It was identified that the increasing magnitude of the spin-S species in a mixed spin-(1/2,S) Heisenberg dimer with comparative Landé g-factors have always a reduction effect on a degree of the quantum entanglement, but it strikingly shifts the thermal entanglement to the higher temperatures. Surprisingly, out of the limit of identical Landé g-factors, the increasing magnitude of spin-S entities can enhance the system entanglement in both low and high magnetic fields. Besides this, we identify that the analyzed dimer with a high-enough magnitude of the spin-S entities at a sufficiently high magnetic field can exhibit unconventional thermally driven re-entrance between the entangled and unentangled mixed state. The importance of the electric-field stimuli is also discussed in detail.
**Keywords :** quantum and thermal entantanglement, mixed spin Heisenberg model, negativity, reentrant phase transition
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