

Heisenberg Model in a Rotating Magnetic Field

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Abstract: We study the Heisenberg model under the influence of a rotating magnetic field. By using a time-dependent unitary transformation, the time evolution operator for the Schrödinger equation is obtained, which involves no chronological product. The spin vectors (mean values of the spin operators) are obtained as explicit functions of time in the most general case. A series of cyclic solutions are presented. The nonadiabatic geometric phases of these cyclic solutions are calculated, and are expressed in terms of the solid angle subtended by the closed trace of the total spin vector, as well as in terms of those of the individual spins.

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Key words: Heisenberg model, rotating magnetic field, cyclic solutions, geometric phase

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