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【161】 Ground state crossings on spin clusters from tunneling interference

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We present a method on how to calculate analitically the energy splitting between the two lowest levels of spin models on non-frustrated clusters in lowest-order degenerate perturbation theory. We apply it to arbitrary size 1D chains and small 2D and 3D clusters and find that by tunning an external magnetic field, the ground can be made degenerate on N different fields, where N is the number of spins. We argue that this phenomena is independent of the geometry, requiring only competing terms in the model. We study the effect of disorder on the position of the crossings and on the tunneling rate to further show the robustness of the zeros.

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