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Performance enhancement of quantum annealing by non-traditional quantum driving

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After an introduction and an overview of quantum annealing, I describe recent developments in non-traditional protocols to control quantum effects for enhanced performance: (i) non-stoquastic drivers [1], (ii) spatially inhomogeneous driving of the field [2], and (iii) reverse annealing [3]. I will show explicit examples in which first-order quantum phase transitions can be avoided by these methods, implying an exponential speedup in comparison with the traditional simple transverse-field driving.

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