

## Day 4

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Title: Fast forward of quantum annealing model in triangle spin systems.

Abstract:

We propose a scheme of the fast forward of adiabatic spin dynamics in a triangular 3 spin cluster of quantum annealing model and reveal the structure and role of driving pair-wise interaction and three-body interactions. We settle the quasi-adiabatic spin dynamics (QASD) by adding the regularization terms to the original Hamiltonian and accelerate it with use of a large time-scaling factor which realizes QASD on shortened time scale. Assuming the candidate regularization Hamiltonian consisting of three-body interactions besides the pair-wise exchange interactions and magnetic field, we solved the regularization terms. These terms multiplied by the velocity function give rise to the state-dependent counter-diabatic terms (CDTs) for each of adiabatic states. Applying this method to quantum annealing model, we find CDTs which include pair-wise interaction and the 3-body interactions. The driving pairwise and three-body interaction in the fast-forward scheme guarantees the complete fidelity of accelerated states.