Contribution ID: **62** Type: **not specified**

Frustrated magnetism via bold diagrammatic Monte Carlo

Tuesday, 18 February 2014 16:30 (30 minutes)

Properties of geometrically frustrated spin systems in various dimensions, geometries, and temperature regimes constitute one of the main research directions of modern condensed matter physics. These studies however are severely hampered by the infamous sign problem synonymous with frustrated geometry.

Here I summarize key physical features of frustrated quantum antiferromagnet, using triangular as an example, and then proceed to describe first successful application of the bold diagrammatic Monte Carlo technique, based on exact Popov-Fedotov trick of representing spin operators with fermions, to this important problem. I present results for the static spin correlation function at various temperatures and describe unexpected approximate quantum-to-classical correspondence between short-distance behaviors of the quantum and classical spin models.

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