Abstract Submitted
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Hints of possible spin-liquid state in the spin-1/2 triangular-lattice Heisenberg antiferromagnet[1] NIKOLAY PROKOFIEV, University of Massachusetts, Amherst, MA 01003, SERGEY KULAGIN[2], Institute for Nuclear Research of the Russian Academy of Sciences, Moscow, 117312, OLEG STARYKH, University of Utah, Salt Lake City, UT 84112, BORIS SVISTUNOV, CHRISTOPHER VARNEY, University of Massachusetts, Amherst, MA 01003 — We calculate magnetic susceptibility of the triangular-lattice quantum antiferromagnet in the correlated paramagnet regime and reveal surprising microscopic correspondence between quantum and classical models at all accessible temperatures $T > 0.375J$. Namely, we observe a perfect match between the quantum static (zero Matsubara frequency) response $\chi(r)$, where r is the spatial coordinate, and its classical counterpart calculated at temperature $T_{cl}(T)$. The correspondence curve is rather featureless and smoothly extrapolates to a finite value of $T_{cl} = 0.28J$ when $T/J \to 0$. If this extrapolation indeed holds true, then finite value of $T_{cl}(0)$ implies that spins are not ordered in the ground state and form a spin liquid. Existing numerical evidence would *not* be in contradiction with the spin liquid state because the spin correlation length for the classical Heisenberg model at $T_{cl} \approx 0.28J$ is > 1000 lattice periods and simulations dealing with small system sizes $L < 10$ would misidentify the ground state as ordered. Our results are based on the high-order skeleton Feynman diagrams within the fermionization framework.

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