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Spin Liquid States on the Triangular Lattice: A Projective Symmetry Group Analysis of Schwinger Boson States FA WANG, ASHVIN VISHWANATH, UC Berkeley — Recent numerical and experimental results on quantum spin systems on the triangular lattice have revealed several unusual phenomena. Motivated by these developments, we apply the Projective Symmetry Group Analysis, previously used to classify spin liquid states obtained within a fermionic spin representation, to Schwinger bosons mean field states on the triangular lattice. We find several distinct Z_2 spin liquid states, but restricting attention to states with nonvanishing nearest neighbor amplitudes we find only two candidates. The first (zero-flux state) is the well known state introduced by Sachdev, which on condensation of spinons leads to the 120 degree ordered state. The other solution which we call the Pi-flux state has not previously been discussed. It is found to be stable against order up to a much larger value of the quantum parameter than the zero-flux state, which makes it an attractive candidate spin liquid state. When spinon condensation does occur, the ordering wavevector is at the Brillouin zone edge centers, different from the 120 degree state. While the zero-flux state is more stable with just nearest neighbor exchange, we find that the introduction of either next-neighbor antiferromagnetic exchange or four spin ring exchange tends to favor the Pi-flux state.

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