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Thermal phase transitions to valence-bond-solid states in the two dimensional SU(N) Heisenberg models TAKAFUMI SUZUKI, University of Hyogo, KENJI HARADA, Kyoto University, HARUHIKO MATSUO, RIST, SYNGE TODO, NAOKI KAWASHIMA, University of Tokyo — The two-dimensional (2D) SU(N) Heisenberg model with n-fold singlet projectors, namely the JQ_n model [1], is believed to be a good example to study the deconfined critical (DC) scenario[2], because this hosts a quantum phase transition between valence-bond-solid (VBS) and magnetic ordered states at $T = 0$. The DC scenario tells us that the universality should be same and independent on the broken lattice-rotation symmetry: the same criticality is observed in both JQ_3 model on the honeycomb lattice (Z_3) and JQ_2 model on the square lattice (Z_4) [3]. However, the thermal phase transition to the VBS phase may be drastically affected by the breaking symmetry. In this study, we consider the SU(N) JQ_n models on square and honeycomb lattices and study the thermal phase transition to the VBS phases. From the QMC calculations, we discuss the critical properties for (1) the lattice dependence, (2) N dependence, and (3) coupling ratio Q_n/J dependence. [1] T. Senthil, et al., Science 303, 1490 (2004); M. Levin and T. Senthil, Phys. Rev. B 70, 220403(R) (2004). [2] A. W. Sandvik, Phys. Rev. Lett. 98, 227202 (2007). [3] K. Harada, et al., arXiv:1307.0501.

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