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On the origin of Mott transition and fractionalized spin liquids¹ ZIQIANG WANG, Department of Physics, Boston College, Chestnut Hill, MA 02467, USA, LONG LIANG, Department of Applied Physics, Aalto University School of Science, FI-00076 Aalto, Finland, SEN ZHOU, Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing 100190, China — An analytical solution of the Mott transition is obtained for the Hubbard model on the Bethe lattice in the large coordination number (z) limit. The excitonic binding of the doublons and holons is shown to be the origin of a continuous Mott transition between a metal and an emergent quantum spin liquid insulator where the opening of the Mott gap and the vanishing of the quasiparticle coherence coincide at the same critical U_c . The doublon-holon binding theory enables a different large-z limit and a different phase structure than the dynamical meanfield theory (DMFT) by allowing intersite spinon correlations to lift the 2^N -fold degeneracy of the local moments. We show that the spinons are coupled to doublons/holons by a dissipative compact U(1) gauge field that is in the deconfined phase, stabilizing the spin-charge separated gapless spin liquid Mott insulator.

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