Spin Liquid Ground State of Spin-1/2 Square J_1-J_2 Heisenberg Model HONG-CHEN JIANG, Kavli Institute for Theoretical Physics, University of California, Santa Barbara, CA 93106, HONG YAO, Department of Physics, Stanford University, Stanford, CA 94305, LEON BALENTS, Kavli Institute for Theoretical Physics, University of California, Santa Barbara, CA 93106 — We perform highly accurate density matrix renormalization group (DMRG) simulations to investigate the ground state properties of the spin-1/2 antiferromagnetic (AFM) square lattice Heisenberg J_1-J_2 model on numerous long cylinders with circumference up to 10 lattice spacings. Besides finding the conventional Neel AFM phase at small $J_2/J_1 <$0.41 and the stripe AFM phase at large $J_2/J_1 >$0.62, we establish an intriguing gapped quantum spin liquid phase within the parameter space 0.41$< J_2/J_1 <$0.62 by showing the absence of various conventional broken symmetries as well as by identifying topological features such as finite topological entanglement entropy and topological "even-odd" effect.

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