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Quantum disordered phase in bond-diluted two-dimensional Heisenberg antiferromagnets RONG YU, TOMMASO ROSCILDE[1], STEPHAN HAAS, Department of Physics and Astronomy, University of Southern California — We investigate quantum phase transitions in the spin-1/2 Heisenberg antiferromagnet on square lattices with *inhomogeneous* bond dilution. It is shown that quantum fluctuations can be continuously tuned by inhomogeneous bond dilution, eventually leading to the destruction of long-range magnetic order on the percolating cluster. We find two multicritical points at which the magnetic transition separates from the percolation transition, taking a quantum nature. Beyond these multicritical points a quantum-disordered phase appears, characterized by an infinite percolating cluster with short ranged antiferromagnetic order. In this phase, the low-temperature uniform susceptibility diverges algebraically with non-universal exponents. This is a signature that the novel quantum-disordered phase is a *quantum Griffiths phase*, as also directly confirmed by the statistical distribution of local gaps. This study thus presents evidence of a genuine quantum Griffiths phenomenon in a two-dimensional Heisenberg antiferromagnet.

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