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Frustration in the Hubbard model: a quantum cluster study ANDRIY NEVIDOMSKYY, University of Sherbrooke, Quebec, Canada, CHRISTIAN SCHEIBER, Technical University of Graz, Austria, DAVID SENECHAL, University of Sherbrooke, Quebec, Canada — The role of frustration in the Hubbard model is studied on the square lattice with nearest and next-nearest neighbour hoppings t and t' using the Variational cluster perturbation theory (VCPT, see [1]). We find two phases with long-range magnetic order: the usual antiferromagnet (AF1) phase, stable at small t'/t, and the so-called superantiferromagnetic phase (AF2) for large frustration. These are separated by a phase with no magnetic order. We also find d-wave superconductivity (d_{x2-y2}) for small values of $U \leq 4t$ and sufficiently weak frustration. The Mott-Hubbard transition is discussed in this context. We also compare the classical phase diagram obtained from the large-U expansion with that of the frustrated J_1-J_2 Heisenberg model.

[1] M. Potthoff, M. Aichhorn, C. Dahnken, Phys. Rev. Lett. **91**, 206402 (2003).

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