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**Bilayer antiferromagnet with four-spin interaction**<sup>1</sup> THOMAS C. LANG, Boston University, TU Graz, Austria, ANDERS W. SANDVIK, Boston University — We investigate a spin-1/2 Heisenberg antiferromagnet with four-spin interaction on bilayer square and honeycomb lattices. In addition to the standard Neel and quantum disordered phases, these models can be expected to have a valence-bond-solid (VBS) phase [1]. Our aim is to locate the VBS phase and to investigate, in particular, a transition from quantum disorder to VBS. This is potentially a deconfined quantum critical point [1]. We use a recently introduced ground state projection Monte Carlo method which allows us to study these models without negative-sign problems [2].

[1] A. Vishwanath et al, Phys. Rev. B **69**, 224416 (2004).

[2] A. W. Sandvik, Phys. Rev. Lett. **95**, 207203 (2005).

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