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Anomalous Curie response of an impurity in a quantum critical spin-$1/2$ **Heisenberg antiferromagnet**[1] KAJ HÖGLUND, Åbo Akademi University, ANDERS SANDVIK, Boston University — There is a disagreement concerning the low-temperature (T) magnetic susceptibility $\chi^z_{\rm imp} \sim \mathcal{C}/T$ of a spin-S impurity in a nearly quantum critical antiferromagnetic host. Field-theoretical work [1] predicted an anomalous Curie constant $S^2/3 < \mathcal{C} < S(S+1)/3$, while a competing Green's function theory [2] suggested $\mathcal{C} = S(S+1)/3$. A numerical effort [3] left the matter unsettled. We employ the stochastic series expansion (SSE) algorithm and perform unbiased $T > 0$ quantum Monte Carlo simulations in order to resolve the controversy. Our main result is for a vacancy in a quantum critical spin-1/2 Heisenberg antiferromagnet on a bilayer lattice. In our susceptibility data for the $S = 1/2$ impurity we observe a Curie constant $\mathcal{C} = 0.262(2)$. Although the value falls outside the predicted range, it should correspond to an anomalous impurity response, as proposed in Ref. [1]. [1] S. Sachdev, C. Buragohain, and M. Vojta, Science **286**, 2479 (1999); M. Vojta, C. Buragohain, and S. Sachdev, Phys. Rev. B **61**, 15152 (2000). [2] O. P. Sushkov, Phys. Rev. B **62**, 12135 (2000). [3] M. Troyer, Prog. Theor. Phys. Supp. **145**, 326 (2002).

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