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Bose-Einstein Condensation in Han Purple - a NMR Study[1]
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— NMR study of the two quasi-2D coupled spin-1/2 dimer compound, $BaCuSi_2O_6$ (Han Purple) [1], is presented. $T_{\rm BEC}$ varies as $(H-H_{c1})^{2/d}$, where d is the dimensionality of the system, and H_{c1} the critical field which closes the gap. $BaCuSi_2O_6$ was claimed to exhibit an reduction of d from 3D to 2D at low T [2]. However, due to a structural transformation at 90 K, different intradimer exchange couplings and different gaps ($\Delta_{\rm B}/\Delta_{\rm A}$=1.16) exist in every second plane along the c axis [3]. In our first NMR experiments [3], we have shown that the population of bosons in the B planes $n_{\rm B}$ was much smaller than $n_{\rm A}$, but finite in the field range $\Delta_{\rm A}/g\mu_{\rm B} < H < \Delta_{\rm B}/g\mu_{\rm B}$ where $n_{\rm B} = 0$ is expected in a naive model of uncoupled planes. Recently, a new model has been presented [4] which takes into account both frustration and quantum fluctuations. This leads to a non-zero population $n_{\rm B}$ of *uncondensed* bosons in the B plane, increasing quadratically with $(H - H_{c1})$, as compared to the linear dependence of $n_{\rm A}$. We compare our new NMR results to these predictions. [1] M. Jaime *et al.*, PRL **93**,087203 (2004). [2] S. E. Sebastian *et al.*, Nature **441**, 617 (2006). [3] S. Krämer *et al.*, PRB **76**, 100406(R) (2007). [4] N. Laflorencie and F. Mila, PRL **102**, 060602 (2009).

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