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Perturbation Effects in the Spin-Singlet State of the Two-Dimensional System $SrCu_2(BO_3)_2$ ADAM ACZEL, GRAEME LUKE, GREG MACDOUGALL, JOSE RODRIGUEZ, CHRIS WIEBE, HANNA DABKOWSKA, McMaster University, YASUTOMO UEMURA, PETER RUSSO, ANDREI SAVICI, Columbia University, HIROSHI KAGEYAMA, Kyoto University — $SrCu_2(BO_3)_2$ is a quasi-two dimensional spin system with a spin-singlet ground state. This system has attracted much interest recently due to its relevance to the two-dimensional Shastry-Sutherland model. We have performed μSR studies on single crystals of $SrCu_2(BO_3)_2$. We observe two different muon sites which we associate with muons located adjacent to the two inequivalent O sites in the system. One site, presumed to be located in the Cu-O-Cu superexchange path, exhibits a large increase in the Knight shift with decreasing temperature which is unaffected by the singlet formation, indicating that the muon has locally broken at least one spin singlet bond and created some quasi-free spins. Further evidence of this phenomenon is provided by examining our ZF-μSR data, as we observe a large increase in relaxation for the site with the large Knight shift. This is in contrast to the weak, practically temperature-independent relaxation expected in a singlet state. In this talk, I will present TF, ZF, and LF-μSR data describing this system and explain this perturbation effect in more detail. In addition, results for single crystals doped on the Cu and Sr sites will be presented.

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