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Emergence of a Novel Frozen Magnetic State in Heavily Over-Doped $La_{2-x}Sr_xCuO_4$[1] JEFF SONIER, CHRISTINA KAISER, VIGHEN PACRADOUNI, Department of Physics, Simon Fraser University, SEYED-AHMAD SABOK-SAYR, Department of Physics, Northern Illinois University, CHRIS COCHRANE, Department of Physics, Queens University, DOUG MACLAUGHLIN, Department of Physics and Astronomy, SEIKI KOMIYA, Central Research Institute of Electric Power Industry, NIGEL HUSSEY, H. H. Wills Physics Laboratory, University of Bristol — It has been proposed that the termination of superconductivity in heavily overdoped copper oxides is caused by the emergence of competing ferromagnetism. We report on a direct examination of this scenario in overdoped $La_{2-x}Sr_xCuO_4$ using the technique of muon spin relaxation. We detect the onset of static magnetic moments of electronic origin beyond the superconducting "dome", where antiferromagnetic correlations are absent. The magnetism does not exist in a commensurate long-range ordered state, but instead appears as a dilute concentration of static magnetic moments. The results are qualitatively consistent with electronic band calculations that predict weak ferromagnetic order about Sr-rich clusters.

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Jeff Sonier
Department of Physics, Simon Fraser University

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