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Recent Magnetic Neutron Scattering Experiments on the Electron-Doped Superconductor $\mathbf{Nd_{2-x}Cu_xCuO_4}$

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The study of the fascinating properties of the high-T_c superconductors has arguably been one of the most important themes in physics during the past two decades. One of the fundamental issues in this quest is the investigation of the different roles of hole vs. electron doping of the Mott insulator parent compounds in order to attain superconductivity. While the vast majority of experimental studies has focused on the properties of the hole-doped materials, there has been renewed interest in the electron-doped side of the of the high-T_c phase diagram. We present recent magnetic neutron scattering experiments on the prototypical compound $Nd_{2-x}Ce_xCuO_4$. Our work takes advantage of the fact that the upper critical field is relatively small for the electron-doped materials, and it provides new insight into the connection between antiferromagnetism and superconductivity. Among our new findings are a linear magnetic field effect on the superconducting magnetic gap and the evolution of the instantaneous spin correlations from the antiferromagnetic to the superconducting phase.