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# Ultrafast probes of spin and charge dynamics

*Wednesday, 25 July 2012 09:00 (25 minutes)*

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I will describe two time-resolved optical studies, one on the electron doped high Tc superconductor NCCO and the other on the two dimensional electron gas in GaAs quantum wells. The former experiments were performed in collaboration with Martin Greven's group U. Minnesota, and the latter with Mike Lilly of Sandia. In both cases, low-energy excitations, on the scale of meV's, are revealed, despite the fact that the optical probe is at the rather high energy of 1.5 eV. In NCCO, time-resolved optics sees critical slowing down of fluctuations with decreasing T that suggest the approach to a quantum critical point. In the 2DEG experments, phase-resolved transient grating techniques reveal low energy propagating modes of helical spin polarization.

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