



Condensed Matter Optics & NanoFemto Group Seminar

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Excited electronic states in carbon nanotubes

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Single-walled carbon nanotubes (SWNTs) have remarkable electronic properties that arise from their reduced dimensionality. Recent advances in nanotube optical spectroscopy, including absorption, fluorescence, and light scattering, are improving our understanding of nanotube electronic transitions. This seminar will address two fundamental properties of excited electronic states in carbon nanotubes: (a) their excitonic nature (b) sensitivity to chemical doping. We access the exciton states in SWNTs by a combination of one-photon and two-photon spectroscopy. These experiments show that the exciton binding energy in nanotubes is substantial and decreases monotonically with increasing nanotube diameter. Chemical hole-doping occurs upon formation of a sidewall oxide and results in fluorescence quenching at very low oxide concentrations. We propose a quenching mechanism based on non-radiative carrier recombination.