

Abstract Submitted
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**Manifestation of electron-electron interactions in time-resolved
ultrafast pump-probe spectroscopy in C_{60}** ¹ GUOPING ZHANG, Indiana

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The electron-electron interaction EEI is at the core of modern physics from high-
temperature supercon- ductivity to giant magnetoresistance. Nanostructures, in
general, and C_{60} , in particular, open a new frontier for the study of the electron
correlation effect in quasi-zero-dimensional materials. Here, a direct investigation
of the time-resolved pump-probe signal in C_{60} shows [1] that the on-site electron-
electron interaction manifests itself in two aspects in the early stage of ultrashort
laser excitation. First, it pushes the signal peak to an earlier time delay for below-
resonance excitation and narrows the peak-time change with probe detuning [2].
Second, it shortens the quasiparticle lifetime and, if the interaction is strong enough,
it diminishes the spike in the lifetime at resonance. These features are detectable
experimentally, and the findings here suggest a different route to detect dynamical
EEI in nanostructure [3].

[1] Zhang and George, Phys. Rev. B **76**, 085410 (2007); [2] Zhang and George, J.
Opt. Soc. Am. B **24**, 1150 (2007); [3] Zhang *et al.*, J. Phys. Chem. A **113**, 1175
(2009)

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