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Investigation of the optical absorption of a magnetic colloid from the thermal to the electronic time-scale regime: measurement of the free-carrier absorption cross-section

Daniel Espinosa, Diogo Soga, Sarah Alves, Leonardo De Boni, Sérgio Carlos Zílio, and Antônio Martins Figueiredo Neto

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Abstract

The free-carrier absorption cross-section σ of a magnetic colloid composed of magnetite nanoparticles dispersed in oil is obtained by using the Z-scan technique in different experimental conditions of the laser beam. We show that it is possible to obtain σ with picosecond pulsed and millisecond chopped beams with pulse frequencies smaller than about 30 Hz. For higher pulse frequencies, the heating of the colloidal system triggers the appearance of the Soret effect. This effect artificially increases the value of σ calculated from the experimental results. The limits of the different experimental setups are discussed.

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Kurt Busch, Editor-in-Chief

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