

Giant ultrafast Kerr effect in superconductors

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We study the ultrafast Kerr effect and high-harmonic generation in superconductors by formulating a model for a time-varying electromagnetic pulse incident on a superconductor. It is found that superconductors exhibit exceptionally large third-order nonlinearities due to the progressive destruction of Cooper pairs, and that they also display high-harmonic generation at low incident

intensities:

the highest nonlinear susceptibility of all known materials in the THz regime. Our theory opens the way for accessible

analytical and numerical studies of the ultrafast dynamics of superconductors.