

Intense terahertz pulse-induced breaking of BCS superconducting phase in NbN

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We studied ultrafast dynamics of a nonequilibrium BCS state in superconductor NbN by terahertz pump-terahertz probe spectroscopy. Intense THz pulse excitation induces the suppression of superconductivity within 2 ps due to direct photo-injection of high-density quasiparticles. The optical conductivity in the terahertz pulse-induced nonequilibrium BCS state cannot be explained by the increase of effective temperature. The complex conductivity spectrum shows the essential importance of the spatial condensation of quasiparticles and the extraordinary nonthermal quasiparticle distribution due to the phonon bottleneck effect.

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