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Accession number:12687801
Title:Ultrastrong coupling of the cyclotron transition of a 2D electron gas to a THz metamaterial
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Source title:Science
Abbreviated source title:Sci. (USA)
Volume:335
Issue:6074
Publication date:16 March 2012
Pages:1323-6
Language:English
ISSN:0036-8075
CODEN:SCIEAS
Document type:Journal article (JA)
Publisher:American Association for the Advancement of Science
Country of publication:USA
Material Identity Number:FK72-2012-014
Abstract:Artificial cavity photon resonators with ultrastrong light-matter interactions are attracting interest both in semiconductor and superconducting systems because of the possibility of manipulating the cavity quantum electrodynamic ground state with controllable physical properties. We report here experiments showing ultrastrong light-matter coupling in a terahertz (THz) metamaterial where the cyclotron transition of a high-mobility two-dimensional electron gas (2DEG) is coupled to the photonic modes of an array of electronic split-ring resonators. We observe a normalized coupling ratio, Ω/ω_c = 0.58, between the vacuum Rabi frequency, Ω, and the cyclotron frequency, ω_c. Our system appears to be scalable in frequency and could be brought to the microwave spectral range with the potential of strongly controlling the magnetotransport properties of a high-mobility 2DEG.
Number of references:32
Inspec controlled terms:cavity resonators - galvanomagnetic effects - ground states - metamaterials - microwave materials - optical resonators - quantum electrodynamics - terahertz materials - two-dimensional electron gas
Uncontrolled terms:cyclotron transition - THz metamaterial - terahertz metamaterial - ultrastrong light-matter coupling - high-mobility two-dimensional electron gas - 2D electron gas - photonic mode - electronic split-ring resonator - vacuum Rabi frequency - cyclotron frequency - microwave spectral range - magnetotransport property - high-mobility 2DEG
Inspec classification codes:B1320 Waveguide and stripline components - B4110 Optical materials - B1305 Microwave materials
Treatment:Practical (PRA)

Discipline:Electrical/Electronic engineering (B)
DOI:10.1126/science.1216022
Database:Inspec
IPC Code:H01P1/00