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Magnetic-field tunable electron-phonon coupling in graphite LI-CHUN TUNG, Dept. of Phys. and Astrophys., University of North Dakota, W. YU, School of Physics, Georgia Institute of Technology, P. CADDEN-ZIMANSKY, Department of Physics, Columbia University, M. KINDERMANN, School of Physics, Georgia Institute of Technology, D. SMIRNOV, National High Magnetic Field Laboratory, Z. JIANG, School of Physics, Georgia Institute of Technology — Electron-phonon coupling (EPC) plays a pivotal role in condensed matter physics, governing intriguing phenomena such as superconductivity, ballistic transport, and excited-state dynamics. In graphitic systems, EPC is found to be strongly related to the quasiparticle excitations, electronic states and optical properties. Thus, the EPC may be manipulated via external parameters, such as electric field or magnetic field, and provide alternative access to adjust the characteristics of carbon-based devices. Here, we explore the EPC in graphite via magnetophonon resonance using cyclotron resonance (CR) spectroscopy. A marked avoided-level-crossing splitting of the CR and a Fano resonance-like behavior are observed, when the CR energies intersect the specific phonon energies via tuning the magnitude of the magnetic field. We attribute these results to the resonance between the CR excitations and the large momentum zone-edge, and the long-wavelength zone-center phonons, respectively. This work suggests that rich interacting physics exists in graphitic materials, which may have profound implications in future optoelectronics.

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