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Sorting Category


16b Metal-Insulator Transitions
Doped Semiconductors

Nonlinear Transport and Magnetic Tuning of the Metal-Insulator Transition in Degenerately Doped n -Type Ge¹.

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Magnetic fields have pronounced effects on the transport properties of semiconductors doped above the zero field critical density. In particular, degenerately doped n -type Ge can be driven through a metal-insulator transition, which appears to be purely a mobility transition, by the application of large magnetic fields at low temperatures. The resulting high-field insulating state shows a sharp onset of nonlinear conduction when electric fields larger than a specific threshold are applied to the sample, reminiscent of the nonlinear behavior seen in charge density wave systems. Analysis of the magnetic field and temperature dependence of this nonlinear behavior, however, indicate behavior which is most likely due to variable range hopping. Consistent with previous measurements of thermoelectric behavior of this system, interactions appear to play a role in this nonlinear conduction.

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