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Electrical transport properties of CaB_6[1] JOLANTA STANKIEWICZ, Instituto de Ciencia de Materiales de Aragón and Departamento de Física de la Materia Condensada, CSIC–Universidad de Zaragoza, 50009-Zaragoza, JAVIER SESÉ, Instituto de Nanociencia de Aragón and Departamento de Física de la Materia Condensada, Universidad de Zaragoza, 50018-Zaragoza, Spain, GEETHA BALAKRISHNAN, Department of Physics, University of Warwick, Gibbet Hill Road, Coventry CV4 7AL, UK, ZACHARY FISK, Department of Physics and Astronomy, University of California, Irvine, CA 92697, USA — We report results from a systematic electron-transport study in a broad temperature range on twelve CaB_6 single crystals. None of the crystals were intentionally doped. The different carrier densities observed presumably arise from slight variations in the Ca:B stoichiometry. In these crystals, the variation of the electrical resistivity and of the Hall effect with temperature can be consistently explained by a variable charge state of intrinsic defects, most likely B-antisites (B atom replacing Ca atom). Our model is also consistent with the presence of a narrow, defect related, impurity band close to the Fermi level. Thus it may indicate the validity of defect-driven intrinsic ferromagnetism in alkaline-earth hexaborides. The magnetotransport measurements reveal that most of the samples we have studied are close to a metal-insulator transition at low temperatures. The magnetoresistance changes smoothly from negative—for weakly metallic samples—to positive values—for samples in a localized regime.

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