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Universal ratio of Coulomb interaction to geometric quantization in (In, Ga)As/GaAs quantum dots

© M. Bayer[1], A. Ludwig[2], A. Wieck[2]

[1] Experimentelle Physik 2, TU Dortmund,
Dortmund, Germany
[2] Angewandte Festkörperphysik, Ruhr-Universitat Bochum,
Bochum, Germany

E-mail: manfred.bayer@tu-dortmund.de

We study the photoluminescence of self-assembled (In, Ga)As/GaAs quantum dot ensembles with varying confinement potential height. The low energy shift of the s-shell emission with increasing excitation power gives a measure of the Coulomb interaction in these structures as it results from carrier−carrier interactions between the optically injected exciton complexes. When dividing this shift by the dot level splitting, determined by the geometric confinement, we obtain a universal function of the number of involved excitons that is independent of the confinement potential height. This shows an identical scaling of Coulomb interaction and geometric quantization with varying confinement.

We gratefully acknowledge the support of this work by the Deutsche Forschungsgemeinschaft in the frame of TRR 160 (projects A1 and Z1). MB also acknowledges support by the RF Government Grant N 14.Z50.31.0021.

DOI: 10.21883/FTT.2018.08.46253.21Gr

* Полный текст статьи опубликован в журнале „Physics of the Solid State“ (Т. 60. Вып. 8).