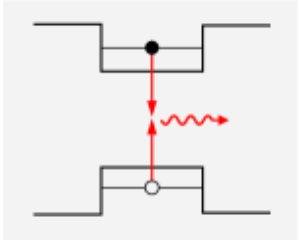
OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

DEPARTMENT OF THEORY OF CONDENSED MATTER

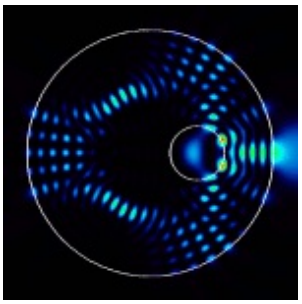
Current research areas



Semiconductor nanostructures: Many-particle physics and quantum optics

The fabrication and analysis of semiconductor nanostructures is one of the most rapidly developing areas of condensed-matter physics. Such structures allow the confinement of charge carriers on nanometer scales with huge potential for applications in particular in opto-electronics and quantum computing. The analysis requires sophisticated methods of many-particle theory a quantum optics, as well as parallel computing on modern high-performance computers. Our focu is on semiconductor quantum dots embedded in optical microcavities.

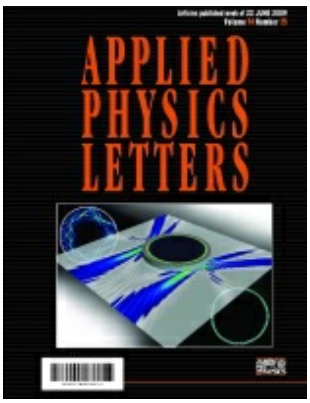
DFG project "Full photon statistics of collective effects in semiconductor nanostructures"

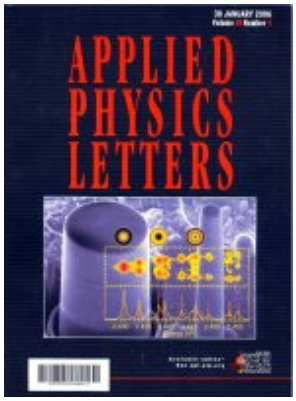


Optical microcavities: Mode structure, quantum chaos, and non-Hermitian effects

Microcavities are the optical analogs of semiconductor nanostructures. They confine light on micrometer scales allowing for an unique control of light with fascinating opportunities for basic research and (quantum) technology. We are interested mainly in the computation of the mode structure (numerically and with perturbation theory) and ray-wave correspondence (quantum chaos) in particular in the context of microlasers. Another focus is on non-Hermitian effects and exceptional points, in particular their applications in optics and photonics.

DFG project "An integrated semiconductor platform for the implementation and study of higher-order exceptional points"



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