

# Physical Colloquium

## „Exciton Dissociation by Topological Edge States“

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Theoretische Physik II



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Exciton dissociation by edge states can enhance the power conversion efficiency of solar cells. To evaluate the potential of this mechanism for carbon nanotubes as absorber material, we show that the topology of carbon nanotubes can be characterized by winding numbers related to the orbital angular momentum. The tight-binding Hamiltonian of any carbon nanotube with CN symmetry can be represented by  $N$  tight-binding Hamiltonians of decoupled molecular chains, for which a pseudospin formulation, characterized by specific paths in a two-dimensional auxiliary space, is developed. The quantum phases are given by the  $N$  winding numbers of these paths. The paths rotate in the auxiliary space when a magnetic field of varying strength is applied along the carbon nanotube, which gives rise to quantum phase transitions.

Host: Prof. Dr. Caterina Cocchi