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Title: Excitons in narrow-gap carbon nanotubes
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Abstract: We calculate the exciton binding energy in single-walled carbon nanotubes with narrow band gaps, accounting for the quasirelativistic dispersion of electrons and holes. Exact analytical solutions of the quantum relativistic two-body problem are obtained for several limiting cases. We show that the binding energy scales with the band gap, and conclude on the basis of the data available for semiconductor nanotubes that there is no transition to an excitonic insulator in quasimetallic nanotubes and that their THz applications are feasible.