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Q1D-Polarons in Rigid Boundary Cylindrical Wires: "Mixed-Coupling Approximation"

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Abstract: We consider the interaction of a confined electron with bulk polar-optical phonons in a cylindrical quantum well wire with infinite boundary potential. Expressions for the polaron self energy and mass are derived within a composite variational scheme consisting of a strong-coupling characterization imposed in the lateral directions and a weak-coupling LLP-counterpart structured along the length of the wire. The formulation is seen to be rather commendable and yields a sensible description of the Q1D-polaron in thin wires of weak or intermediate electron-phonon coupling strengths.

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