

Almost Ab Initio Calculations for Superconductors

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Despite the great success of the BCS theory of superconductivity for explaining properties of “conventional superconductors,” first-principles calculations for T_c and the predictions of new superconductors have been difficult. The major hurdle in applying BCS theory has been the availability of precise theoretical determinations of normal state properties of materials. Here we show that a great deal of progress has been made using the plane wave pseudopotential approach within the “Standard Model” for itinerant solids. Applications to some new and predicted superconductors are described. Examples include C_{60} and C_{36} based solids, nanotubes, and MgB_2 .