Bound states of fermions with short-range interactions in the presence of spin-orbit coupling and Zeeman fields

DOGA MURAT KURKCUOGLU, PhD Student, C. A. R. SA DE MELO, Professor — We discuss the emergence of two-particle bound states of spin-1/2 fermions in the presence of Zeeman fields for arbitrary mixtures of Dresselhaus and Rashba spin-orbit couplings, under the assumption that interactions are short-ranged and occur only in the s-wave channel. In this case, we calculate explicitly binding energies and effective masses and analyze their dependence on spin-orbit couplings, Zeeman fields and interactions. Finally, we note that such exact two-body results serve as important benchmarks for the construction of many-particle wavefunctions that recover the few-particle regime in the low density limit.