

Superfluid-insulator transition in Fermi-Bose mixtures and the orthogonality catastrophe

The superfluid-insulator transition of bosons is strongly modified by the presence of Fermions. Through an imaginary-time path integral approach, we account for the static as well as the dynamical screening effects of the Fermions on the boson's superfluid transition line. We find that an effect akin to the fermionic orthogonality catastrophe, arising from the fermionic screening fluctuations, suppresses superfluidity. We analyze this effect for various mixture parameters and temperatures, and consider possible signatures of the orthogonality catastrophe effect in other measurables of the mixture.