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Vacuum Polarization Corrections to the Bosonic Mass Spectrum of Superfluid ^{3}He-B[1] JAMES SAULS, Northwestern Univ, TAKESHI MIZUSHIMA, Osaka Univ — ^{3}He is a $S = 1$, $L = 1$ BCS condensate with total spin $J = 0$. In addition to broken $U(1)$ symmetry, spin and orbital rotation symmetries are broken to $SO(3)_J$. Fermions acquire a mass, $m_F \equiv \Delta$, given by the BCS gap Δ, and there are 18 Bosonic excitations - 4 Nambu-Goldstone (NG) and 14 Higgs modes - labeled by $J \in \{0, 1, 2\}$, and charge conjugation parity, $C = \pm 1$. For each J, J_z, there are two Bosonic partners with $C = \pm 1$. Based this Nambu proposed a sum rule relating the Fermion and Boson masses for BCS type theories: $M^2_{J^+} + M^2_{J^-} = 4m^2_F$, for each family labelled by J, where M_{JC} is the mass of the Bosonic excitation labelled by (J, C). Nambu's sum rule (NSR) has recently been discussed in the context of the standard model to speculate on possible partners to the recently discovered Higgs Boson. We point out that Nambu's Fermion-Boson mass relations are not exact. Corrections to the masses of the Higgs modes arising from polarization of the parent Fermionic vacuum lead to substantial violations of Nambu's sum rule. Vacuum polarization corrections to the $J = 2^{\pm}$ masses, as well as the NSR, are presented. A comparison between theory and experiment for the masses of the $J = 2^{\pm}$ modes of ^{3}He-B is presented.

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James Sauls
Northwestern Univ

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