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Temperature Dependence of Dynamic Structure Factors in Ultracold Fermi Gases: Bragg Scattering From BCS to BEC HAO GUO, CHIH-CHUN CHIEN, KATHRYN LEVIN, James Franck Institute and department of physics, the University of Chicago — While the behavior of the static and dynamic structure factors in the ground state of a Fermi gas superfluid are well studied, little is known about the behavior at general temperatures T. This is an important issue: density-correlation function measurements of these structure factors through, for example, Bragg scattering, will indicate the transition temperature T_c, which is often difficult to identify. Equally importantly they can help to establish whether a pseudogap is present in the normal state. We show how to compute these structure factors for a homogeneous system using a natural extension of the BCS-Leggett ground state to finite temperatures. We demonstrate how to include gauge invariance in a fully consistent fashion, along with pairing correlations. Our results should provide important predictions for future experiments.

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