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Electron-Electron Interaction in the Uniform Electron Gas¹

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We discuss the effective electron-electron interaction of uniform electron gas in a broad temperature regime covering the superconducting phase, Fermi liquid phase, and the warm dense electron gas. We develop a variational diagrammatic Monte Carlo technique to calculate the structure factor and spin susceptibility with high precision. The data allow us to parameterize the exchange-correlation kernel for the electron-electron interaction. We find that the effective interaction leads to exotic superconductivity at a low temperature. Meanwhile, it also causes a universal quantum correction to the structure factor of a warm dense electron gas in the high-temperature limit.

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