FFLO physics in spin-polarized Fermi gases in one dimension

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I will discuss pairing correlations in a 1D Fermi gas with attractive interactions, loaded into an optical lattice. Using the density matrix renormalization group method I'll show that the ground state of the negative-U Hubbard model is of the Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) type, i.e., pairing correlations oscillate in real-space, with the wave-length set by the difference of the Fermi wave vectors of the majority and minority species. Second, I'll discuss the density profiles of such a system in a harmonic trap, which have been measured in a recent experiment at Rice University. Third, an extension to a two-channel model description of a spin-polarized Fermi gas will be studied that incorporates the closed channel molecules, relevant close to a Feshbach resonance. Within this so-called Bose-Fermi resonance model, as a result, we find that the FFLO state is stable on the BCS side yet competes with a Bose-Fermi mixture, stable on the BEC side. Finally, I'll comment on open questions, namely schemes for the experimental observation of FFLO correlations and the evolution of the FFLO state in the dimensional crossover from 1D to 2D.