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Pseudogap phenomenon near the phase transition from p_x- to $p_x + ip_y$-wave Fermi superfluid DAISUKE INOTANI, YOJI OHASHI, Department of Physics, Keio University — We discuss an ultracold superfluid Fermi gas with a p-wave Feshbach resonance (FR). In this system, it has been predicted that the split of p_x-, p_y-, and p_z-wave channels in the p-wave FR by a dipole-dipole interaction leads to multi-superfluid phases. While the p_x-wave state appears below T_c, the $p_x + ip_y$-wave state is expected to become more stable below a certain temperature ($\equiv T_c^{p_x+ip_y} < T_c$). In this talk, including the split of FR, as well as p-wave pairing fluctuations, within a T-matrix approximation, we find that, near $T_c^{p_x+ip_y}$ in the p_x-phase, pairing fluctuations in the non-condensed p_y- and p_z-wave channels cause the pseudogap phenomenon in the nodal direction of the p_x-wave order parameter. This pseudogap is shown to continuously change into the p_x-wave superfluid gap, as one goes away from the nodal direction. Since pairing fluctuations are soon suppressed below T_c in the ordinary s-wave case, this pseudogap near $T_c^{p_x+ip_y}$ ($< T_c$) is a characteristic phenomenon of a p-wave Fermi superfluid with multi-superfluid phases. In this talk, we also discuss how this pseudogap develops, as one decreases the temperature from T_c to $T_c^{p_x+ip_y}$.

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