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**Coulomb Gas in the Large-N Limit: no Spin-Splitting of the Effective Mass** SUHAS GANGADHARAIAH, DMITRII MASLOV, University of Florida — Recent experiment [1] revealed an unusual feature of the electron effective mass ($m^*$) in Si MOSFETs: while $m^*$ exhibits a strong dependence on the electron density ($r_s$), it does not depend on the degree of spin polarization. Also, the masses of electrons with up- and down spins are the same. These findings are in an apparent contradiction with the Fermi-liquid theory, which predicts two different and polarization-dependent masses in a partially spin-polarized regime, both in the weak- and strong-coupling limits. We show that the effective mass of the Coulomb gas in the large-N limit (for Si MOSFET, $N = 4$) is renormalized primarily to a polaronic effect: emission/absorption of high energy plasmons. As plasmons are classical objects, the quantum degeneracy, and hence polarization, does not affect the effective mass to the leading order in $1/N$. Polarization dependence shows up at the next-to-leading orders. We find that for $r_s = 2 - 6$ the change in effective mass between unpolarized and fully polarized states is within $1 - 3\%$, which is consistent with the experiment. [1] A. A. Shashkin, M. Rahimi, S. Anissimova, S. V. Kravchenko, V. T. Dolgopolov, and T. M. Klapwijk, Phys. Rev. Lett. **91**, 046403

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