Erratum: Fluctuating stripes in strongly correlated electron systems and the nematic-smectic quantum phase transition [Phys. Rev. B 78, 085124 (2008)]

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In our paper we reported an incorrect result for the fermion self-energy correction in the smectic phase. The second expression in Eq. (7.5) should read

$$i g_S \bar{\Phi} n(\vec{q},\omega)\phi_\Phi(-\vec{q},-\omega) + h.c.$$

As a result, the fermion scattering rate for fermions in band n at momentum $\vec{k}$, where $\vec{k}$ is on the reconstructed Fermi surface, expression (E3), should be

$$\Sigma''_{n,\phi_\Phi}(\vec{k},\omega) = \sum_{n'} \frac{|\bar{\Phi}|^2}{2} \int_{0<\epsilon_{n'}(\vec{k}-\vec{q})<\omega} \frac{d\vec{q}}{(2\pi)^2} |\tilde{g}_S^{n,n'}(\vec{k},\vec{q})|^2 B_{\phi_\Phi}[\vec{q},|\omega| - \epsilon_{n'}(\vec{k}-\vec{q})],$$

where $\epsilon_n(\vec{k})$ is the dispersion relation for fermions in band n and the vertex is

$$\tilde{g}_S^{n,n'}(\vec{k},\vec{q}) = i g_S \sum_m [T_{n,m+1}(\vec{k}-\vec{q})T_{n',m}(\vec{k}) - T_{n,m}(\vec{k}-\vec{q})T_{n',m+1}(\vec{k})].$$

Here $T_{n,m}$ is the matrix element of the orthogonal transformation defined in Eq. (D3). The energy gap between two different energy bands dictated that the contributions from the interband scatterings ($n \neq n'$) scale as ω^2 at small ω, which is subleading to the Fermi liquid behavior. As for the intraband scatterings, the vertex vanishes linearly in the long wavelength limit ($q \sim 0$) as

$$\tilde{g}_S^{n,n}(\vec{k},\vec{q}) = i g_S \sum_m [\nabla T_{n,m}(\vec{k})T_{n,m+1}(\vec{k}) - \nabla T_{n,m+1}(\vec{k})T_{n,m}(\vec{k})] \cdot \vec{q} + O(q^2).$$

This is because the Goldstone mode cannot couple directly to the fermion density but to its fluctuations, as required by the translational symmetry. As a consequence of this structure of the vertex, we found that the quasiparticle scattering rate from intraband scatterings are subleading corrections to the Fermi liquid behavior by numerically evaluating the integral shown above. For an electronic smectic phase in the continuum, at most part of the Fermi surface, the quasiparticle scattering rate scales as $\Sigma''(k_F,\omega) \sim \omega^2 \log|\omega|$ at low frequency. At the special points as marked on Fig. 2(c), $\Sigma''(k_F,\omega) \sim \omega^{3/2}$. In the presence of a lattice background, which breaks the continuous rotational symmetry explicitly, an unpinned smectic phase has $\Sigma''(k_F,\omega) \sim \omega^2 \log|\omega|$ at most part of the Fermi surface, while $\Sigma''(k_F,\omega) \sim \omega^2$ at the special points where $\tilde{g}_S^{n,n}(\vec{k},\vec{q})$ is independent of q_t to the linear order of $\vec{q}$, with q_t being the component of $\vec{q}$ parallel to the reconstructed Fermi surface. This result corrects also the summary presented in Table I on the behavior of Σ'' in the smectic phase. This correction does not change any of the other conclusions of the paper.

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[1] T. R. Kirkpatrick and D. Belitz, arXiv:0905.4285, Phys. Rev. Lett. (to be published).

