

Abstract Submitted
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Antiferromagnetism and hot spots in CeIn₃¹ PAVEL GRIGORIEV, LEV GOR'KOV, NHMFL, FSU — Enormous mass enhancement at “hot spots” on the Fermi surface (FS) of the antiferromagnetic CeIn₃ has been reported at strong magnetic field near its antiferromagnetic quantum critical point [T. Ebihara et al., Phys. Rev. Lett. 93, 246401 (2004)]. The effect was ascribed to anomalous spin fluctuations at these spots owing to peculiar strong many-body interactions. The “hot spots” lie at the positions on FS same as in non-magnetic LaIn₃ where the narrow necks are protruded, thus, hinting on their possible relation. Assuming that in paramagnetic phase CeIn₃ has similar spectrum, we study the influence of the antiferromagnetic ordering (AFM) on the energy spectrum of CeIn₃ and show that its FS undergoes a topological change at the onset of AFM. The necks at the “hot spots” are truncated by the AFM, thus restoring the almost spherical d-part of the FS of CeIn₃. Applied field suppresses the AFM and restores the necks on the FS (so-called 2.5-order phase transition) leading to logarithmic divergence of the dHvA effective mass when the electron trajectory passes near or through the restored necks. This effect fully explains the observed dHvA mass enhancement in the “hot spots” in the frameworks of one-particle approximation and leads to the predictions concerning the spin-dependence of the effective electron mass.

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