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Antiferromagnetism and hot spots in CeIn3[1] PAVEL GRIGORIEV, LEV GOR'KOV, NHMFL, FSU — Enormous mass enhancement at "hot spots" on the Fermi surface (FS) of the antiferromagnetic $CeIn_3$ 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 $LaIn_3$ where the narrow necks are protruded, thus, hinting on their possible relation. Assuming that in paramagnetic phase $CeIn_3$ has similar spectrum, we study the influence of the antiferromagnetic ordering (AFM) on the energy spectrum of $CeIn_3$ 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 $CeIn_3$. 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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Pavel Grigoriev
National High Magnetic Field Lab., FSU

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