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Emergence of heavy quasiparticles from a massless Fermi sea: Optical conductivity HYUN-YONG LEE, Department of Physics and BK21 Physics Research Division, Sungkyunkwan University, Suwon 440-746, Korea, STEFAN KETTEMANN, School of Engineering and Science, Jacobs University Bremen, D-28759 Bremen, Germany — We study the density of states and the optical conductivity of a Kondo lattice which is immersed in a massless Dirac Fermi sea, as characterized by a linear dispersion relation. As a result of the hybridization V with the f-electron levels, the pseudo-gap in the conduction band becomes duplicated and is shifted both into the upper and the lower quasiparticle band. Furthermore, we find that due to the linear dispersion of the Dirac fermions, the Kondo insulator gap is observable in the optical conductivity in contrast to the Kondo lattice system in a conventional conduction band, and the resulting gap$[\Delta_{\rm gap}(T)]$ depends on temperature. The reason is that the Kondo insulator gap is an indirect gap in conventional Kondo lattices, while it becomes a direct gap in the Dirac Fermi Sea. We find that the optical conductivity attains two peaks and is vanishing exactly at $2bV$ where b is a condensation of slave boson depending on temperature.

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