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Quantum oscillations in $YBa_2Cu_3O_{6+\delta}$ from period-8 d-density wave order[1] ZHIQIANG WANG, JONGHYOUN EUN, SUDIP CHAKRAVARTY, University of California, Los Angeles — We consider quantum oscillation experiments in $YBa_2Cu_3O_{6+\delta}$ from the perspective of an incommensurate Fermi surface reconstruction using an exact transfer matrix method and the Pichard-Landauer formula for the conductivity. The specific density wave order responsible for reconstruction is a period-8 d-density wave in which the current density is unidirectionally modulated, which is also naturally accompanied by a period-4 charge order, consistent with recent nuclear magnetic resonance experiments. This scenario leads to a natural explanation as to why only oscillations from a single electron pocket of a frequency of about 500 T is observed, and a hole pocket of roughly twice the frequency as dictated by the two-fold commensurate order and the Luttinger sum rule is not observed. In contrast period-8 d-density wave leads to a hole pocket of roughly half the frequency of the electron pocket. The observation of this slower frequency will require higher, but not unrealistic, magnetic fields than those commonly employed. There is already some suggestion of the slower frequency in a measurement in fields as high as 85 T.

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