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Two-dimensional charge transport in polycrystalline black phosphorus XUXU BAI, YANRU SONG, BEI BAO, Shanghai Jiao Tong University, LILIN SUN, Institue of Physics, Chinese Academy of Sciences, SHUN WANG, YING LIU, Shanghai Jiao Tong University — Black phosphorus, a narrow band gap semiconductor, is the only elemental layered material other than graphene. Theoretical calculations indicate the electronic state of single layer black phosphorus is different from that of the bulk, similar to graphene, which has attracted attentions in the condensed matter physics community. Here we report preliminary electrical transport measurements in bulk polycrystalline black phosphorus. Our results of the temperature dependence of resistivity reveal 2D variable range hopping transport behavior below 10 K. In the hopping regime, the magnetoresistance is negative at weak magnetic field, due to quantum interference of the hopping wave functions in two dimensions, and positive at stronger field. Hall effect and the anisotropy of the magnetoresistance will also be discussed.

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