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De Haas-van Alphen quantum oscillations in $LuSn_2$ YANGLIN ZHU, JIN HU, Tulane University, DAVID GRAF, National High Magnetic Field Laboratory, ZHIQIANG MAO, Tulane University, DAVID GRAF COLLABORATION — We have successfully synthesized single crystals of binary compound $LuSn_2$ and observed strong De Haas-van Alphen (dHvA) quantum oscillations with three oscillation frequencies (F_α = 70T, F_β = 422T and F_γ = 511T for H//c) in this material. From the analyses of dHvA oscillations, the quasi-particles of this material are found to be very light ($m_\alpha = 0.053\ m_0$, $m_\beta = 0.067\ m_0$, $m_\gamma = 0.072\ m_0$, where m_0 is the mass of a bare electron) and possess high quantum mobility (2500 cm^2/VS for F_α band). For the F_α component, the evidence of non-trivial Berry phase was also revealed from the fit the of the oscillation pattern to the Lifshitz-Kosevich formula which takes Berry phase into account for a topological material. The angular dependence of F_α indicates the F_α band is quasi-two dimensional. These observations imply possible existence of a quasi-2D bulk Dirac state in $LuSn_2$. This result calls for further verification by first-principle calculations and ARPES experiments.

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