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NMR studies of phase transition form a metallic state to a Dirac-electron state in the organic system, θ-(BEDT-TTF)$_2$I$_3$[1] KAZUYA MIYAGAWA, MICHIHIRO HIRATA, KYOHEI ISHIKAWA, TOMOTAKA TANIGUCHI, University of Tokyo, MASAFUMI TAMURA, Tokyo University of Science, KAZUSHI KANODA, University of Tokyo — The Dirac electron phase is realized in the bulk organic systems, θ and α-(BEDT-TTF)$_2$I$_3$. The bulky nature of the system allows one to study the Dirac electrons in the spin degrees of freedom by means of NMR (K. Miyagawa et al. JPSJ **7**9, 063703 (2010)). Moreover, in θ-(BEDT-TTF)$_2$I$_3$, the Dirac electron phase neighbors a metallic (superconducting) phase in a pressure-temperature phase diagram. To clarify how the Dirac phase emerges from the metallic state, we performed ^{13}C NMR measurements for this material at ambient and under pressures. The angular dependence of NMR spectra demonstrates that all the molecules are equivalent (Hirata et al. PRB **8**5, 195146, (2012)). The temperature dependences of Knight shift and spin-lattice relaxation rate, $1/T_1$, hold the Korringa relation, which signifies metallicity under pressures before the transition to the Dirac phase. However, after the system undergoes a transition to the Dirac electron state, the NMR spectral shape becomes complicated indicating a structural phase transition. The analysis of the angular dependence of the NMR spectra shows the molecular arrangement changes from theta to alpha type.

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