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^{13}C NMR studies on the organic zero-gap system, θ-(BEDT-TTF)$_2$I$_3$ under pressure KAZUYA MIYAGAWA, University of Tokyo and JST-CREST, MOTOAKI HIRAYAMA, University of Tokyo, MASAFUMI TAMURA, RIKEN, KAZUSHI KANODA, University of Tokyo and JST-CREST — We present NMR data for the organic material, θ-(BEDT-TTF)$_2$I$_3$ under pressure, which is a candidate for zero-gap conductor with cone-like dispersion. The quasi-two-dimensional organic conductor α-(BEDT-TTF)$_2$I$_3$ is known to show peculiar behaviors under high pressure. The resistivity is insensitive to temperature, while the Hall coefficient is strongly dependent on temperature. The band calculation suggests that this system is in the zero gap state with a linear dispersion around the Fermi energy. While the θ-(BEDT-TTF)$_2$I$_3$ is metallic under ambient pressure, above 5 kbar temperature dependences of resistivity and Hall coefficient are similar to those of α-(BEDT-TTF)$_2$I$_3$. It is remarkable that the graphine like zero-gap state is likely realized in a bulk system. We have performed preliminary investigation into the magnetism of θ-(BEDT-TTF)$_2$I$_3$ under 8 kbar by ^{13}C NMR. The external filed is applied to parallel to the conducting layer. In constant to the simple metallic behavior observed under ambient pressure (Korriga's relation holds), the Knight shift vanishes in proportion with temperature and $1/T_1$ shows a steep decrease, which is roughly $T^3 \sim T^4$ down to 4 K . These behaviors are consistent with the zero (or narrow) gap state picture.

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