Localized 5\textit{f} antiferromagnetism in cubic UIn$_3$: $^{115}$In-NMR/NQR Study

H. SAKAI, S. KAMBE, Y. TOKUNAGA, H. CHUDO, Japan Atomic Energy Agency, Y. TOKIWA$^1$, D. AOKI$^2$, Osaka University, Y. HAGA, Japan Atomic Energy Agency, Y. ÔNUKI$^3$, Osaka University, H. YASUOKA, Japan Atomic Energy Agency

$^{115}$In nuclear magnetic resonance (NMR) and nuclear quadrupole resonance (NQR) measurements have been performed on an antiferromagnet UIn$_3$ with the cubic AuCu$_3$-type structure. The NQR frequency ($\nu_Q$) and Knight shift ($K$) of $^{115}$In in UIn$_3$ have been estimated in the paramagnetic state from NMR experiments under applied field. The perpendicular component of transferred hyperfine coupling constant ($A_\perp$) has been deduced from scaled behavior of $K$ to the static susceptibility ($\chi$). Under zero field, the observation of the NQR spectrum has led to an estimated $\nu_Q$ of 11.8 MHz at 90 K. The temperature variation of the NQR relaxation rates ($1/T_1$) far above the Néel temperature $T_N$=88 K approaches a constant value, which indicates a localized nature for the 5\textit{f} electrons in this system.

On the other hand, in the antiferromagnetically ordered state at 4 K (well below $T_N$), the $^{115}$In-NMR spectrum has been scanned over frequencies ranging from $\sim$20 to $\sim$70 MHz under zero applied field. From the analysis of the NMR spectrum, we propose that the direction of U moments in the AF state is neither $\langle 100 \rangle$ nor $\langle 111 \rangle$, but may be $\langle 110 \rangle$.

$^1$Present Affiliation: Georg-August- Universität Göttingen
$^2$Present Affiliation: CEA-Grenoble
$^3$Also at: Japan Atomic Energy Agency

Hironori Sakai
Japan Atomic Energy Agency

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