Quadrupole Moments of the ^{40}Ca Core Plus One Nucleon Nuclei ^{41}Sc and ^{41}Ca

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The electric-field-gradient (EFG) and anisotropic chemical shift of ^{45}Sc($I^{\pi} = 7/2^-$, stable) in TiO$_2$ crystal were determined by detecting the FT-NMR of ^{45}Sc(0.5 atm% of Ti in TiO$_2$) doped in TiO$_2$ crystal at a high field of 7.0 T and 9.4 T. Using the EFG, an old β-NQR spectrum of ^{41}Sc was reanalyzed to obtain $eqQ(^{41}$Sc$)/h$ which was combined with the renewed $Q(^{45}$Sc$) = -(23.6 \pm 0.2)$ fm^2 to obtain $|Q(^{41}$Sc; $I^{\pi} = 7/2^-, T_{1/2} = 0.596$ s$)| = (15.6 \pm 0.3)$ fm^2. Also the atomic EFG in Ca was recalculated, using a finite-element multi configuration Hartree-Fock method to renew $Q(^{43}$Ca$)$. Finally using the known hyperfine constants of ^{41}Ca, the $Q(^{41}$Ca$)$ value has been renewed.

Key words: Quadrupole Moments of Sc and Ca Isotopes; Electric Field Gradients; Ca and Sc Atoms; TiO$_2$.