

# Electric Field Gradient at Nb Site in the Intermetallic Compounds $Nb_3X$ ( $X = Al, In, Si, Ge, Sn$ ) Measured by PAC

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The electric field gradient (efg) at the Nb site in the intermetallic compounds  $Nb_3X$  ( $X = Al, In, Si, Ge, Sn$ ) was measured by the Perturbed Angular Correlation (PAC) method using the well-known gamma-gamma cascade of 133 - 482 keV in  $^{181}Ta$  from the  $\beta^-$  decay of  $^{181}Hf$ , substituting approximately 0.1 atom percent of Nb. The PAC results show that  $V_{zz}$  drops by nearly 40% when X changes from Al to In, and by about 25% when X changes from Si to Ge and Sn. This behavior is most probably related to the change in the degree of sp hybridization in these compounds. The  $V_{zz}$  values of the studied compounds do not follow the well known universal correlation for the efg's in non-cubic metals but the observed trend is well reproduced by results of ab-initio electronic structure calculations. In the case of  $Nb_3Al$  a linear temperature dependence of the quadrupole frequencies was observed in the temperature range of 6.5 to 1210 K.

*Key words:* Electric Field Gradient; PAC Measurements; Nb-based Alloys; Quadrupole Interactions.