The $\beta-\gamma$ perturbed angular correlation technique is applied to the determination of g-factor of 603 keV ($2^+$) state ($\tau = 8.5$ psec) of $^{124}$Te populated in the decay of $^{124}$Sb. The activity was diffused into a thin iron foil. A small C type electromagnet was used for polarizing the sample. Internal field acting at the Tellurium nucleus in iron was used for perturbing the $\beta-\gamma$ angular correlation. The g-factor extracted is $g = 0.28 \pm 0.05$. This is in good agreement with that obtained by $\gamma-\gamma$ perturbed angular correlation method.

**INTRODUCTION**

The method of perturbed angular correlations (PAC) using $\gamma-\gamma$ cascades has been extensively applied for the determination of the magnetic moments of the excited nuclear states and hyperfine fields in ferromagnetic media. This method has also been applied to the levels populated by Coulomb excitation and nuclear reactions. The possibility of applying PAC to $\beta-\gamma$ cascades was suggested by Nielsen and Deutch and applied in the case of $^{154}$Eu $\rightarrow$ $^{154}$Gd. In this case radioactive Europium atoms were implanted in a thin iron foil by electromagnetic isotope separator. The uncertainties like lattice damage and interstitial positions which may be present in the implanted source could give ambiguous values for the hyperfine field. It was thought that such uncertainties can be overcome if the radioactive atoms are diffused in the iron foil. In the present work we have used this method of preparing the sample and the method of $\beta-\gamma$ PAC to determine the g-factor of the 603 KeV ($2^+$) first excited state of $^{124}$Te populated in the decay of $^{124}$Sb.
The partial decay scheme (ref. 2) of $^{124}$Sb $\rightarrow$ $^{124}$Te is shown in Fig. 1. The $(3^- \rightarrow 2^+ \rightarrow 0^+)$ angular correlation in this decay has been extensively studied by many workers$^{2-4}$ and has as large anisotropy as 40%. The lifetime of the 603 keV level and the hyperfine field at Te nucleus in iron are known. The $g$ factor of the 603 keV level has been determined by various workers using the internal fields in iron by the method of $\gamma-\gamma$ PAC$^{5-7}$ and also by IMPACT measurement$^8$.

![Diagram of decay scheme](image)

**Fig. 1.** Partial decay scheme of 60 d. $^{124}$Sb $\rightarrow$ $^{124}$Te. (Ref. 2)

**EXPERIMENTAL DETAILS**

The natural Antimony metal was irradiated in CIRUS reactor, Trombay, for two months. The sample was cooled for one month for short-lived activities to decay. The Sb metal was then dissolved in concentrated HCl and electrodeposited on 16 mg/cm$^2$ specpure iron foil. The $^{124}$Sb activity was diffused by heating the foil in argon atmosphere for 200 hrs. at 900° C. The sample was then very slowly cooled to room temperature. Finally, the surface activity was removed by etching the foil with dil. HCl. Another source with $^{124}$Sb in Cu was prepared in exactly the same way.