The dissertation presents the studies on the nuclear disintegration characteristics and the decay schemes of the following short-lived nuclides:

\[
\begin{align*}
\text{Fe}^{61} & \quad (T_{1/2} = 5.8 \pm 0.5 \text{ min}) \\
\text{Nb}^{98} & \quad (T_{1/2} = 51 \pm 1 \text{ min}) \\
\text{Tb}^{162} & \quad (T_{1/2} = 7.5 \pm 0.5 \text{ min}) \\
\text{Tm}^{174} & \quad (T_{1/2} = 5.5 \pm 0.3 \text{ min}) \\
\text{Tm}^{176} & \quad (T_{1/2} = 1.4 \pm 0.2 \text{ min})
\end{align*}
\]

All these isotopes are produced with 14.8-MeV neutron bombardments on enriched as well as natural targets by the following reactions: \(\text{Ni}^{64} (n, \alpha) \text{Fe}^{61}\), \(\text{Mo}^{98} (n, p) \text{Nb}^{98}\), \(\text{Dy}^{162} (n, p) \text{Tb}^{162}\), \(\text{Ho}^{165} (n, \alpha) \text{Tb}^{162}\), \(\text{Yb}^{174} (n, p) \text{Tm}^{174}\) and \(\text{Yb}^{176} (n, p) \text{Tm}^{176}\). Since the above reactions have low activation cross-section, and also the final reaction products are short-lived special techniques are utilised to investigate their properties.

Most of the experimental results presented here are obtained for the first time and are the outcome of repeated confirmation of several irradiations and measurements. Some of the main findings of the work are already reported either in symposium reports or in journals, as listed below.

1. Excited Levels in \(\text{Co}^{61}\) from the Decay of \(\text{Fe}^{61}\).

The work is being communicated for publication.
(2) Decay of $^{98}\text{Nb}$ and the Energy Levels in $^{98}\text{Mo}$

(i) Low Energy Nuclear Physics Symposium, Calcutta (1965), Atomic Energy Establishment, India.


(3) Decay of $^{162}\text{Tb}$ and Excited States of $^{162}\text{Dy}$. Accepted for publication in Physical Review.

(4) Decay of $^{174}\text{Tm}$

Low Energy Nuclear Physics Symposium, Bombay (1966), Atomic Energy Establishment, India.

(5) Decay of $^{176}\text{Tm}$ and Excited Levels in $^{176}\text{Yb}$

Low Energy Nuclear Physics Symposium, Bombay (1966), Atomic Energy Establishment, India.

In the thesis equations and figures have been numbered chapterwise and the references (numbers expressed as an index at proper places) are given at the end of each chapter.

The present work was done by the author during 1962-66 at the Saha Institute of Nuclear Physics, Calcutta.