Preface

In this doctoral thesis the poorly known B(E2;$0^+ \rightarrow 2^+$) values of ^{112}Sn and ^{114}Sn have been measured to high precision. Two experiments were performed to determine the reduced transition probabilities of ^{112}Sn and ^{114}Sn relative to ^{116}Sn in order to minimize the systematic errors. The experiments were performed to improve these crucial data points and to firmly establish the location of the unexpected sudden change of B(E2)-values along the Sn isotopic chain. At GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany, we performed two consecutive measurements using ^{114}Sn and ^{116}Sn beams on a ^{58}Ni target. In the experiment carried out at Inter University Accelerator Centre (IUAC), New Delhi, India, targets of ^{112}Sn and ^{116}Sn were bombarded with a ^{58}Ni beam. The obtained B(E2;$0^+ \rightarrow 2^+$) values of 0.242(8) e^2b^2 and 0.232(8) e^2b^2 for ^{112}Sn and ^{114}Sn respectively, are not consistent with the recent large scale shell model (LSSM) calculations. The results confirm the tendency of large B(E2) values for lighter tin isotopes below the mid-shell ^{116}Sn nucleus, that has been observed recently in various radioactive ion beam experiments.

In neutron deficient Sn isotopes for which Coulomb excitation experiments are presently not possible due to lack of sufficient beam intensities, decay studies can be performed to obtain the level scheme in these exotic nuclei. In a fragmentation reaction, angular momenta are transferred to the nuclei of interest, which can be measured after the separation in the fragment separator (FRS) using an effecient gamma array. These experiments require an active stopper detector in order to measure the implantation of the heavy ions as well as its decay peoperties such as electrons, protons and alpha particles. In the second part of the thesis the realization of the active stopper consisting of six double sided silicon strip detector (DSSSD) is discussed.