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STUDY OF CLUSTERIZATION IN Li^6 NUCLEI AT HIGH ENERGY Li^6 INDUCED REACTIONS IN EMULSION

By

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TO MY FAMILY

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This thesis is concerned with the projectile fragmentation reactions induced by Li^6-nucleus with emulsion nuclei at 4.5 A Gev/c incident momentum. Study of these reactions is suggested as a trail to discover the internal structure of the Li^6-nucleus, in other words, to investigate the presence of Li^6 in a cluster configuration at high energy reactions of Li^6-nucleus. The proposed projectile fragmentation processes are namely, stripping, dissociation and general fragmentation reactions.

The separation of these processes via counter experimental setups is known to be very difficult. On the contrary, by using the emulsion technique, the interactions belonging to these processes are easily identified.

The total cross sections of the above mentioned processes are estimated both theoretically and experimentally . The measured angular distributions of the outgoing fragments are compared with that calculated theoretically. A good agreement between the experimental and theoretical values is found. Also, the mechanisms of these processes are discussed and the type of the momentum distribution (inside the projectile) according to which, the features of these mechanisms can be explained.

The study reveals that, during the Li^6 induced reactions at high energy, the Li^6-nucleus behaves as though it consists of "α+d" as two clusters with small contributions from the other cluster configurations.

CHAPTER I

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INTRODUCTION

An extensive amount of experimental data on high energy nucleus-nucleus (AA) collisions has already accumulated since the last two decades. These data provide us with tremendous amount of information and motivated a large number of physists to cover a wide range of aspects in nuclear Physics.

These experiments have been suggested as trials for deeper understanding of several aspects in nuclear physics. Some of these aspects are concerned with the study of reactions mechanisms and multi-particle production. For more deeper understanding and for the purpose of favouring some models over others, the inclusive data are further classified to seminclusive and exclusive data. The first step in this direction is the division of the data into peripheral and central reactions. The former are generally characterized by large impact parameters between the interacting nuclei while the latter have small ones.

The study of central reactions at high energies are mainly concerned with investigation of the occurrence of the new phase transitions such as Quark-Gluon plasma (QGP) that