In search of low-energy nuclear structure of ^{69}Ge by means of fusion-evaporation reactions

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Introduction

The nuclei in A≈70 region just outside the doubly magic ^{56}Ni core exhibit varieties of excitations, both single particle and collective with different shapes, namely prolate, oblate and tri-axial. At low spins, properties of the nuclei are governed by $1f_{5/2}$, $2p_{3/2}$ and $2p_{1/2}$ spherical shell model orbitals. However, at higher spins and excitation energies the particle-hole excitation from the $1f_{7/2}$ orbital below the N=Z=28 shell gap to the $1g_{9/2}$ high-j intruder orbitals above the gap give rise to deformed second minima in the potential and collective behaviour.

Experimental Details

In the fusion-evaporation reaction a beam of ^{28}Si at 100MeV was obtained from the 15-UD pelletron accelerator at Inter University Accelerator Centre (IUAC), New Delhi. The beam was bombarded onto a ^{48}Ti target of thickness 1.0mg/cm^2 backed by 8.0 mg/cm^2 ^{197}Au. The emitted γ rays were detected in coincidence mode with 16 Compton suppressed HPGe clover detectors of the Indian National Gamma Array (INGA).

Analysis of the data is in progress with the help of the standard analysis packages viz. CANDLE [1], RADWARE [2], and INGASORT [3]

Figures and Tables

With the help of PACE4 calculation we can see that in the above mentioned fusion-evaporation reaction at projectile energy 100 MeV we will have maximum population of ^{72}Se, ^{69}Ge and ^{70}As nuclei with cross-section 141 mb, 123 mb and 98.3 mb respectively as shown in Fig.1.

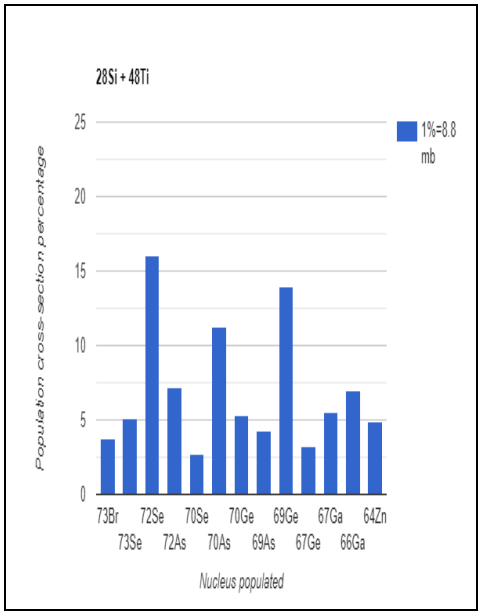

Fig.1 Population cross-section of different nuclei in ^{28}Si+^{48}Ti fusion-evaporation reaction.

Discussion

In F.Becker et al.,[4] ^{69}Ge was produced with the help of ^{12}C+^{60}Ni . The emitted gamma rays were captured using Ge detectors. Level scheme of ^{69}Ge was produced upto energy 9182

keV and upto spin J = 37/2. In our experiment we have used superior HPGe detectors. So here is part of the gamma spectrum peaks that we have got from our experiment as shown in Fig.2. In the workshop, we will discuss more about the level scheme of ^{69}Ge.

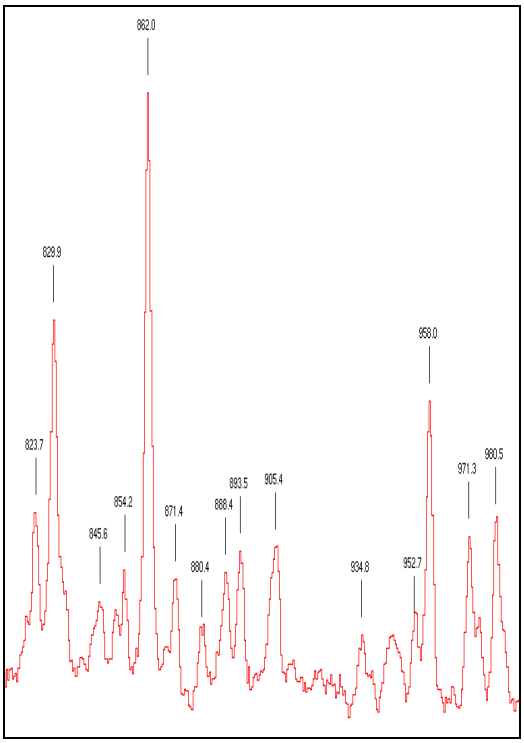

Fig.2 Some strongly populated gamma peaks of ^{69}Ge as identified in our experiment like 958 keV, 824keV,888 keV etc.

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