



Contribution ID: 22

Type: not specified

Coulomb excitation of the band-terminating 12^+ yrast trap in ^{52}Fe

In the last decade the $1f_{7/2}$ - shell nuclei have become a very successful test area for nuclear models and interactions. Near the middle of the shell, nuclei show collective properties similar to those observed in heavier nuclei, such as rotational-like bands, band termination, and backbending phenomena. Presently this is the unique region where it is possible to describe deformed nuclei within both the mean-field and the shell-model frameworks [1,2].

The ^{52}Fe nucleus ($N=Z=26$), with two proton and two neutron valence holes in the doubly magic ^{56}Ni , has been a particular experimental challenge. Many attempts to extend the ^{52}Fe level scheme have failed due to the presence of a 12^+ isomer, which acts as a "trap" for the de-exciting γ -ray flux, thus ^{52}Fe is known up to the 12^+ state [3,4].

The present work aims to investigate the structure and in particular the collectivity in this nucleus by performing relativistic Coulomb excitation of a ^{52}Fe radioactive beam.

The experimental activity has been performed within the AGATA-PRESPEC campaign at GSI. The ^{52}Fe , both ground state and 12^+ isomer, was produced by the fragmentation of a ^{58}Ni primary SIS beam at 600 MeV/u. The ^{52}Fe fragments were selected with the FRS setup and finally impinged the ^{197}Au secondary target.

An isomeric ratio of 16% was reached by using FRS to select the higher momentum part of the secondary beam momentum distribution.

Preliminary results on the Coulomb excitation of the ground state and possibly of the isomer will be presented in this contribution.

[1] G. Martinez-Pinedo et al., Phys. Rev. C 54, R2150 (1996);

[2] S.M. Lenzi et al., Phys. Rev. C 56, 1313 (1997);

[3] C.A. Ur et al., Phys. Rev. C 58, 3163 (1998);

[4] A. Gadea et al., Phys. Lett. B 619, 88 (2005).

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