Ain Shams University
Faculty of Girls for
Arts, Science and Education

Study Of The Level Structure Of ^{115}In

A Thesis

Submitted to College for Girls Ain Shams University
for the Degree of Ph.D (Physics)

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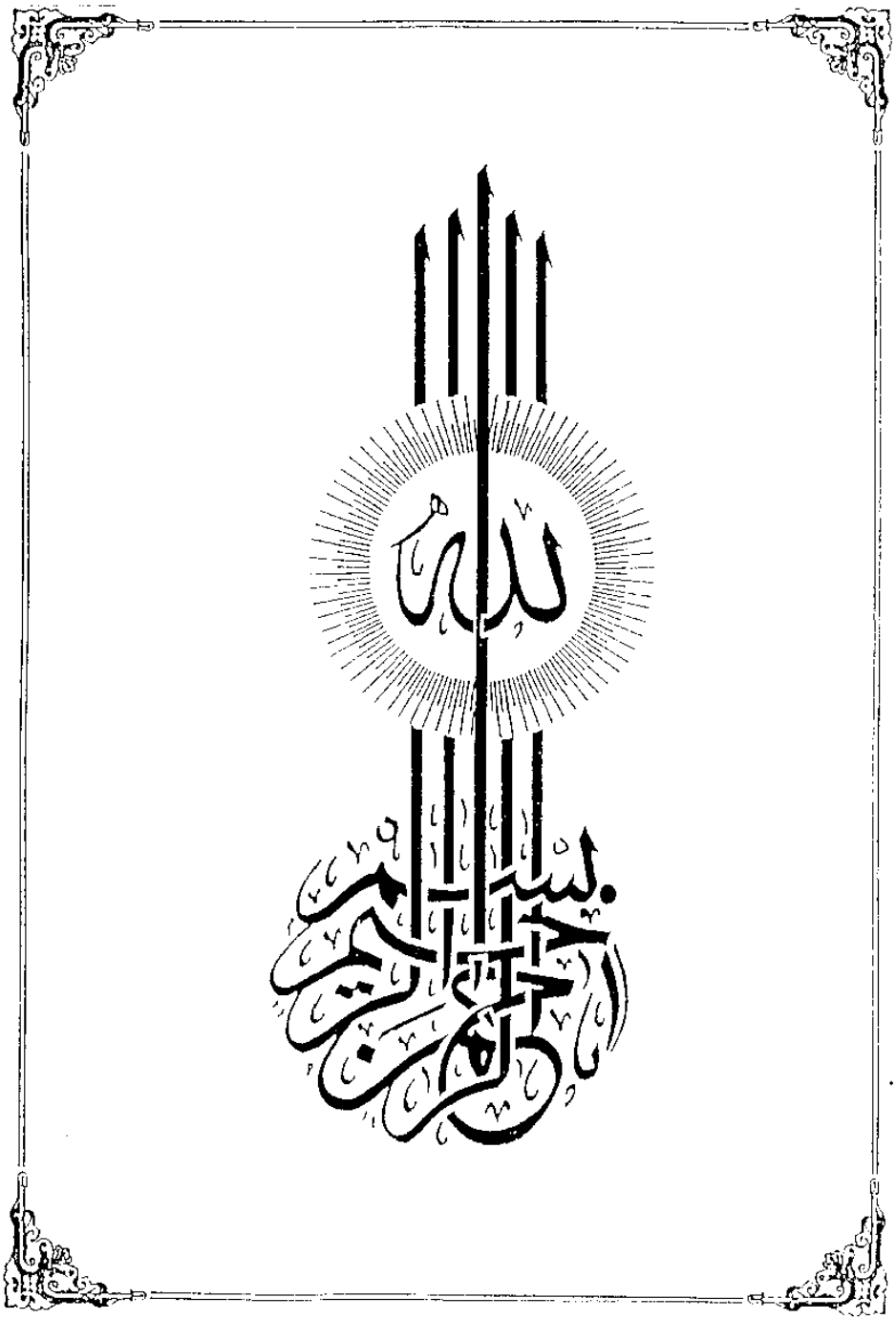

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TITLE OF THESIS

Study Of The Level Structure Of ^{115}In

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ABSTRACT

The decays of ^{115g}Cd and ^{115m}Cd were investigated using a HP Ge singles spectrometer and a HP Ge -NaI (Tℓ) gamma-gamma coincidence spectrometer.

Thirty one gamma transitions were established and confirmed to belong to the ^{115m}Cd decay out of which three new transitions at 251.19, 270.79 and 590.52 KeV were observed for the first time and confirmed to belong to the decay of ^{115m}Cd to ^{115}In.

Sixteen transitions were proved to belong to ^{115g}Cd decay of which 114.13 KeV gamma transition was observed for the first time, and a new position was proposed for the 251.19 KeV transition.

The absolute reduced transition probability for the 941.24 KeV, $B(E2) = 0.51 \times 10^{-2}\ e^2 b^2$, was calculated to give an intrinsic quadrupole moment of 0. 5061 b., This was used to give an approximate value, for the deformation parameter β, of 0.0348 , which is characteristic for nearly spherical nuclei, and is explained by Weisskopf unit which gives a value of B_w (EL) = 0.5537 b.

The relative and total intensities for the gamma-ray transitions have been calculated and from the relative intensity imbalances the β-decay branching ratios were calculated, The log ft-values were determined using the Moszowski nomograms with a slightly expanded version.

A theoretical interpretation of ^{115}In excited states is given using the weak coupling model.

The core ^{116}Sn was assumed to be deformed such that the single hole could occupy three different single hole states, for both the positive and negative parity states. This configuration is done for the first time in discussing the level structure of ^{115}In.

The expected theoretical level scheme is in very good agreement with the present experimental level scheme. The spectroscopic factors were also calculated.

Summary