Ain Shams University,
Faculty of girls, for Art,
Science and Education
Physics Department

SOLID STATE DETECTORS AND ITS APPLICATIONS IN ENVIRONMENT AND ARCHAEOLOGICAL DATING

THESIS
Submitted to Physics department, Faculty of girls, for Art, Science and Education. Ain Shams University,

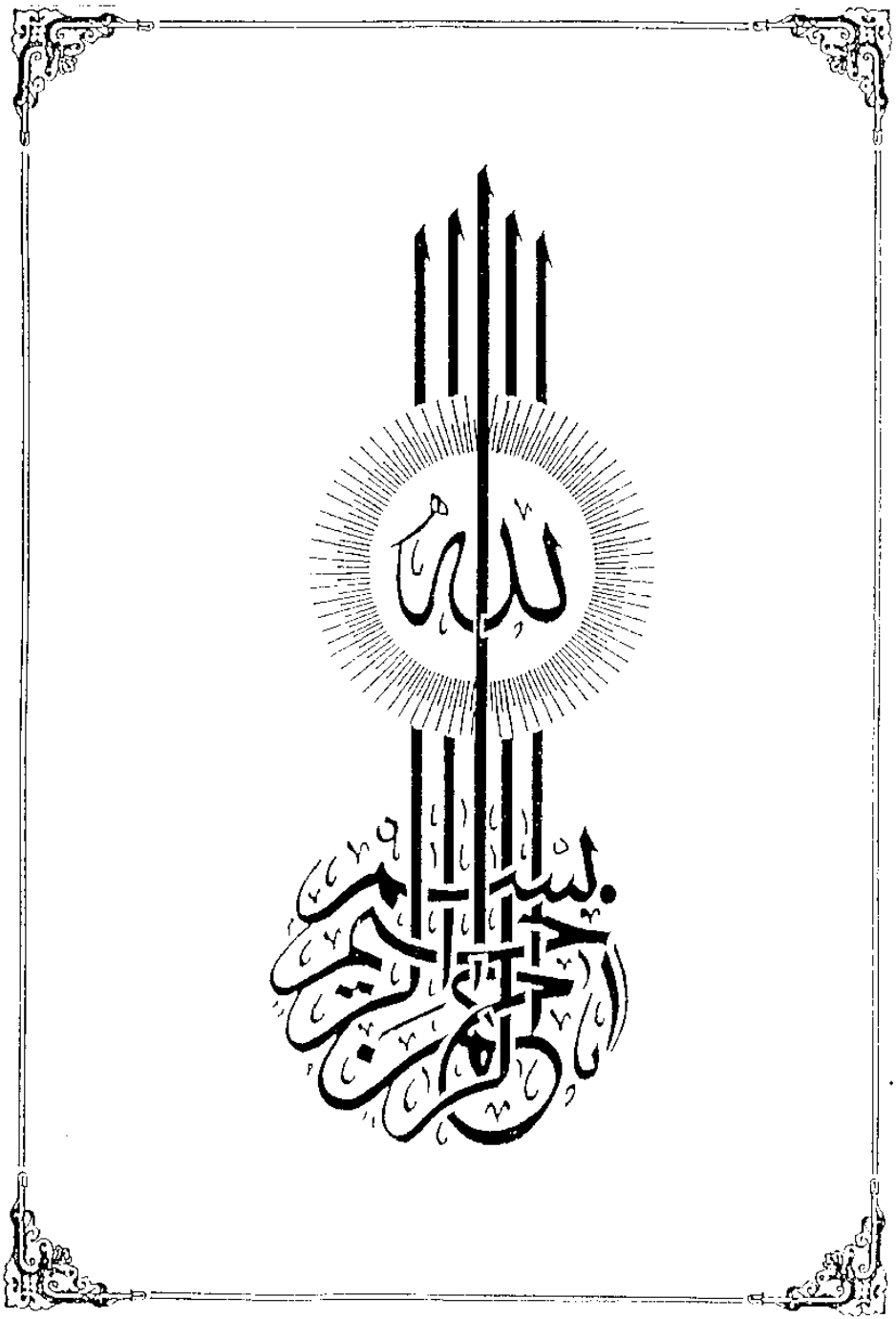
for the degree of
Ph.D.

Presented By

MOHAMED ABD EL-FATAH BELAL

B.Sc. University of Ain Shams,1984.
M.Sc. University of Cairo, 1991.

(1997)



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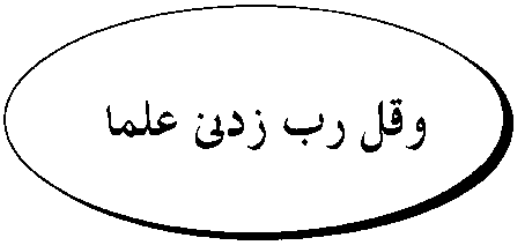

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for the Degree of **Ph.D.**

Presented by : **Mohamed Abd El-fattah Belal**

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Date of research : May 1993
Graduation : B Sc. (Physics) University of Ain Shams,1984.
Post graduate studies: M.Sc.(solid state physics)University of Cairo, 1991.

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Approval of Faculty Council
/ / 1997

Approval of University Council
/ / 1997

Ain Shams University,
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Presentation

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SUMMARY

Egypt has a long history of ancient civilization and culture. The details of the dated dynasties remains to be confirmed, also dating of newly discovered antiquities. Egyptian archaeologists often face the problem of the "accurate" dating of many discovered monuments, because of the shortness of the Egyptian dynasties with respect to the limits of error of the different dating techniques, so that several historical incidents are still uncertain.

The different dating techniques are compared to choose, - the most accurate one, - assigned for abundant and allowed archaeological samples - and capable to be improved using available tools. Dating pottery by thermoluminescence technique has been chosen to investigate its suitability and accuracy.

Pottery samples and their surrounding soil and rocks were collected from pyramid's area with the suitable precautions in order to determine the date of its last firing during fabrication by old man.

The environmental annual dose absorbed by the quartz inclusions was determined by traditional tools. XRF analysis was used to determine the concentrations of the radioactive elements in clay matrix of pottery, therefore the internal dose was calculated. As for the external doses, a) cosmic ray contribution was calculated using the Prescott and Stephan values, b) γ-ray contributions from the surrounding soil and rocks was determined using γ-ray spectroscopy. The effect of moisture was considered. Then the calculated annual dose found to be 3.1443 ± 0.044 mGy/year.

The inclusion quartz were extracted from pottery as a solid state nuclear detector. The plateau test was performed, that showed a good stability at overlapped 325 $^{\circ}$C 375°C TL peak,