بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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Comparative Study for the Production of a Selected Radionuclides Via Different Nuclear Reaction Routes

Thesis Submitted for the Partial Fulfillment of
Master Degree in Physics (Nuclear Physics)

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Comparative Study for the Production of a Selected Radionuclides Via Different Nuclear Reaction Routes

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Date of Approval

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Approval of faculty Council

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قال الله تعالى :

﴿ يَرْفَعِ ٱللَّهُ ٱلَّذِينَ ءَامَنُواْ مِنكُمْ وَٱلَّذِينَ أُوتُواْ ٱلْعِلْمَ دَرَجَٰتٍۚ وَٱللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ ﴿١١﴾ ﴾

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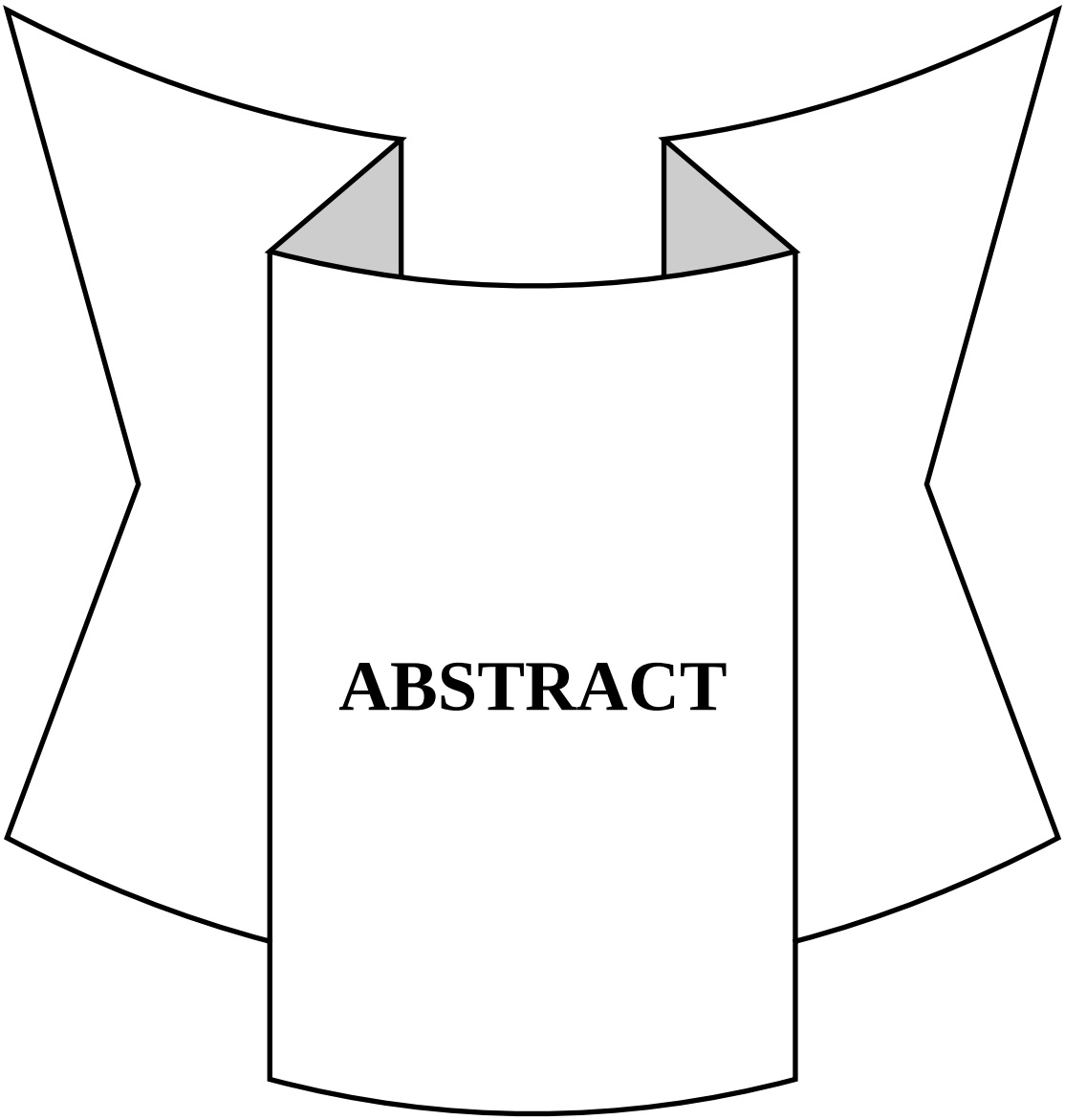
ABSTRACT

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Studies of excitation functions of charged particles induced reactions play an important role in many practical applications in medicine, industry, agriculture. Induced nuclear reactions are of considerable significance for evaluating their use as monitor reactions for determining the energy and intensity of the bombarding beam. As well as for optimization of the beam parameters in the thin layer activation technique (TLA) used for wear, corrosion or erosion measurements.

Nickel is an important element from practical point of view, being used as a target material in accelerator production of medical radionuclides.

The proton induced reaction cross section of nickel has a wide range of applications in nuclear technology. It also plays an important role for the production of isotopes such as ^{60,61,64}Cu,^{55,57,58}Co and ^{57}Ni. ^{61}Cu and ^{64}Cu are very important radiomedical isotopes, both are promising in nuclear medicine.

The well-known stacked foil technique in combination with HPGe γ-ray spectroscopy was used. The measured data compared with the previously reported experimental data and also with the results of theoretical calculations using nuclear models codes ALICE-IPPE and EMPIRE-

3.2.2 as well as TENDL-2017. The present results agree well with the previously reported experimental data, the calculations of the theoretical nuclear models codes ALICE-IPPE and EMPIRE-3.2.2 as well as TENDL-2017.

The excitation functions were measured for nuclear reactions induced by protons on natural Nickel in the energy range from threshold energy up to 14.7 MeV leading to the production of ^{60,61,64}Cu,^{55,57,58}Co and ^{57}Ni radionuclides. The maximum cross section value for ^{64}Cu is about 734mb at 10.56 MeV, while the maximum cross section value for ^{60}Cu is about 107mb at 12.5 MeV.

The integral yields (MBq/μA.h) of the produced radionuclides were estimated from the eye guides of the excitation functions for the formation of ^{55,57}Co and ^{60,64}Cu at 14.7MeV protons are amounted to 9.0, 0.001, 3225.0 and 680.0 MBq/μA.h respectively. Thus sufficient quantities of ^{60,64}Cu can be produced at a small-sized cyclotron.

The calculated statistical parameters for the studied nuclear reactions obtained results provide indication of the quality of the used model codes. The codes give good description of the experimental data in a wide energy region.

Contents

CHAPTER 5: RESULTS AND DISCUSSION