جامعة الكويت
KUWAIT UNIVERSITY

SEMINAR

DEPARTMENT OF PHYSICS

SPEAKER : **Dr. Naser Burahmah**
Consultant – KFAS

TITLE : **Measurement of ^{229}Pa and ^{230}Pa Production Cross Sections from Deuteron Irradiation of Thorium Targets**

DATE : **Monday, March 18th, 2024**

TIME : **12:45 P.M.**

PLACE : **Conference Room – Physics Department**

Abstract

The radionuclides ^{225}Ac and ^{230}U are promising candidates for the targeted alpha therapy of multiple treatment-resistant cancers. One outstanding hurdle impeding pre-clinical evaluations is the scarcity of production pathways which produce these radionuclides with sufficient specific activity. One such potential pathway for both radionuclides utilizes production by bombardment of deuteron beams on natural ^{232}Th. In this work, the excitation functions for both the ^{232}Th(d,5n)^{229}Pa and ^{232}Th(d,4n)^{230}Pa reactions up to 50 MeV deuteron energy were measured using the stacked target technique at the Lawrence Berkeley National Laboratory's 88-Inch Cyclotron. Column chromatography techniques were implemented to isolate Pa. This is required to directly observe the low-intensity γ-rays emitted by ^{229}Pa, which is the decay precursor of the highly sought-after medical radionuclides ^{229}Th and ^{225}Ac. The ^{232}Th(d,4n)^{230}Pa reaction is a possible pathway for the production of carrier-free ^{230}U. In this work, the ^{232}Th(d,5n)^{229}Pa reaction cross sections are reported for the first time. The measured cross sections for the ^{232}Th(d,4n)^{230}Pa reaction are in excellent agreement with published data in the literature. The measured cross sections were compared with predictions using the Particle and Heavy Ion Transport code System (PHITS), TALYS, and the TENDL nuclear data library, which showed strong agreement.