



# COLLOQUIUM

## DEPARTMENT OF PHYSICS

**SPEAKER** : **Dr. Yahya Almumin**  
**Physics Department**

**TITLE** : **Q-balls place in particle physics**

**DATE** : **Wednesday, December 18<sup>th</sup>, 2024**

**TIME** : **12:45 P.M – 13:35 P.M.**

**PLACE** : **Conference Room – Physics Department**

### **Abstract**

Particle physics is known to be the branch of physics that tries to discover the fundamental building blocks of the universe. To achieve this quest, particle physicists try to come up with a framework that is theoretically consistent and explain the phenomena that we observe in the universe. Dark matter is one of these possible theoretical solutions that could explain multiple phenomena that we observe on a cosmological scale. However, the nature of dark matter remains enigmatic. Q-balls are one of the candidates that could explain the nature of dark matter. Q-balls are non-topological solitons that constitute of complex scalars that carry a  $U(1)$  charge. In my thesis, I tried to expand our theoretical understanding of the space of Q-ball solutions to pave the way for a phenomenological understanding of these configurations.

*In the talk, we will discuss particle physics and dark matter, what Q-balls are, how are they related to particle physics, and the findings of thesis.*