The College of Graduate Studies and the College of Science Cordially Invite You to a

Master Thesis Defense

Entitled

RADIO EMISSION FROM LOW MASS ACTIVE GALACTIC NUCLEI

by

Ammara Aftab

Faculty Advisor

Dr. Mohammad Abdul Latif, Department of Physics

College of Science

Date & Venue

3:00 PM

Thursday, 9 November 2023

Room 223, Building F3

Abstract

Massive black holes of a few million to billion solar masses lurk at the centers of the most present-day massive galaxies but their origin is still unknown. The low mass galaxies ($M_* \sim 3x10^9\ M_\odot$) hosting black holes with masses ranging from 10^3 to $10^5\ M_\odot$ are ideal laboratories to test the models of black hole formation and they may help in understanding the co-evolution of central black holes with their host galaxies. In this thesis, we have developed a detailed theoretical model/framework to estimate the radio emission from low mass active galactic nuclei (AGN). We also compute the contribution of radio emission from HII regions and supernova remnants in the host galaxy. Our estimated radio fluxes for AGN of 10^5 -$10^7\ M_\odot$ range from 0.6-2000 nJy at redshift 10 assuming the Eddington limited accretion. The most recent observations by the James Webb Space Telescope have unveiled the presence of low mass AGN at high redshift. We predict that these newly observed sources can be detected in radio with upcoming radio telescopes such as next-generation Very Large Array (ngVLA) and the Square Kilometer Array (SKA) for integration times of 1-100 hours. These observations will unambiguously confirm the existence of AGN.

Keywords: Active galactic nuclei, Black holes, Radio emission, Radio flux, Luminosity, Fundamental planes, Black hole masses, Accretion rates.