Department of Physics and Astronomy Colloquium Series

Tuesday, November 22nd, 2022, 3:00pm in PSE 317

PLEASE NOTE START TIME IS AT 3:00PM

Speaker: Prof. Qing-Bin Lu

Institution: University of Waterloo

Title: Observations and theoretical calculations of global ozone depletion via the cosmic-ray driven electron-induced reaction (CRE) mechanism

Abstract:

The cosmic-ray (CR)-driven electron-induced-reaction (CRE) mechanism of atmospheric ozone depletion was proposed about two decades ago.[1] The subsequent predictions[2] of the existence of 11-year cyclic variations in both polar O_3 loss and associated stratospheric cooling and of the earlier recovery of the Antarctic ozone layer than the ozone layer at mid-latitudes and the tropics are now well proven by observed data over the past two decades[3,4]. Particularly the observed vertical profiles of Antarctic O_3 trends provide the fingerprints of the CRE mechanism.[4] Moreover, using the TOST ozonesonde dataset[5] complemented with satellite data, I discovered the largest tropical ozone hole in 2022,[6] consistent the first report of the largest percentage O_3 loss in the tropical lower stratosphere below 20 km by satellite data by Randel et al.[7] In this talk, I will discuss the progress and present theoretical calculations by the CRE mechanism of ozone depletion in both the Antarctic ozone hole and the tropical ozone hole and at mid-latitudes as well. Additionally, I may briefly present main results from my recent paper on the dominant warming mechanism of CFCs for global warming observed since the mid-1970s.[8]