WESTERN MICHIGAN UNIVERSITY

The Department of Chemistry Presents:

Dr. Elettra Piacentino

Center for Astrophysics

Harvard University and the Smithsonian Institution

"The Aromatic Journey Through Interstellar Ice Chemistry"

Often considered inert, space, with its cold and rarefied conditions, constitutes a unique physical chemistry laboratory where gas, dust, and ices gradually assemble into clouds that can collapse to form stars, planets, and ultimately life. In this extreme environment radical reactions, initiated by energetic radiation, and interactions with highly reactive and unstable species drive the formation of increasingly complex molecules. To what extent can this molecular complexity arise, and what role does it play in shaping the chemical inventory of nascent planets?

I have approached this question through the lens of aromatic molecules, whose stability, reactivity, and astrobiological relevance make them central to understanding molecular complexity in space. To probe their behavior, I examined the thermal properties of aromatic cryogenic ices, finding that they remain solid under most astrophysical conditions. These findings motivated the study of their response to UV irradiation, demonstrating that aromaticity provides resistance to photolysis and limits radical reactions in the ice-phase. This led to investigating reactions of benzene with electronically excited oxygen atoms, uncovering a new reaction pathway for ice-phase ring functionalization. Looking ahead, I aim to bridge ice-phase and gas-phase astrochemistry by investigating the reactivity of organic ices with unstable molecules present in interstellar gas. These studies will allow us to more comprehensively emulate the chemistry of space and deepen our understanding of the molecular complexity that can develop in interstellar ices.

Thursday, January 15, 2026 @ 1 P.M.
1720 Chemistry Building