LABORATORY ICE ASTROCHEMISTRY IN THE ERA OF JWST

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Complex organic species are expected to be formed in a variety of interstellar environments at the surface of ice grains by means of a combination of energetic and nonenergetic processing, e.g., photons, electrons, ions, and atoms. However, to date, many fundamental questions on the physicochemical origin of the observed molecular complexity in space and its link to life on Earth remain unanswered. The recent successful launch, deployment, and commissioning of James Webb Space Telescope (JWST) is a remarkable milestone, marking the onset of a new era for space science, astrophysics, astrochemistry, and astrobiology. The unprecedented combination of JWST and ground-based Atacama Large Millimeter/submillimeter Array (ALMA) observations will map and trace the ice and gas content of the interstellar medium toward a variety of space environments and physicochemical conditions, revolutionizing our understanding of the star formation process. A coordinated effort from the laboratory ice community is now needed to provide state-of-the-art ice spectral analogs that will allow for a correct interpretation of observational ice data. In my talk, I will review the current status of laboratory ice databases and a few emerging techniques that can potentially help address some of the "Grand Challenges" in astrochemistry of the next decade.