INTERSTELLAR AND PLANETARY ANALOGS IN THE LABORATORY

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ABSTRACT

We present and discuss the unique capabilities of the laboratory facility, COSmIC, that was developed at NASA Ames to investigate the interaction of ionizing radiation (UV, charged particles) with molecular species (neutral molecules, radicals and ions) and carbonaceous grains in the Solar System and in the Interstellar Medium (ISM).

COSmIC stands for Cosmic Simulation Chamber, a laboratory chamber where interstellar and planetary analogs are generated, processed and analyzed. It is composed of a pulsed discharge nozzle (PDN) expansion that generates a free jet supersonic expansion in a plasma cavity coupled to two ultrahigh-sensitivity, complementary *in situ* diagnostics: a cavity ring down spectroscopy (CRDS) system for photonic detection and a Reflectron time-of-flight mass spectrometer (ReTOF-MS) for mass detection. This setup allows the study of molecules, ions and solids under the low temperature and high vacuum conditions that are required to simulate some interstellar, circumstellar and planetary physical environments providing new fundamental insights on the molecular level into the processes that are critical to the chemistry in the ISM, circumstellar and planet forming regions, and on icy objects in the Solar System.

Recent laboratory results that were obtained using COSmIC will be discussed, in particular the progress that have been achieved in monitoring in the laboratory the formation of solid particles from their gas-phase molecular precursors in environments as varied as circumstellar outflow and planetary atmospheres.

REFERENCES

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