

A Mass Selective Radiofrequency Transfer Line for the Injection of Molecular Ions in a Cold Uniform Supersonic Flow

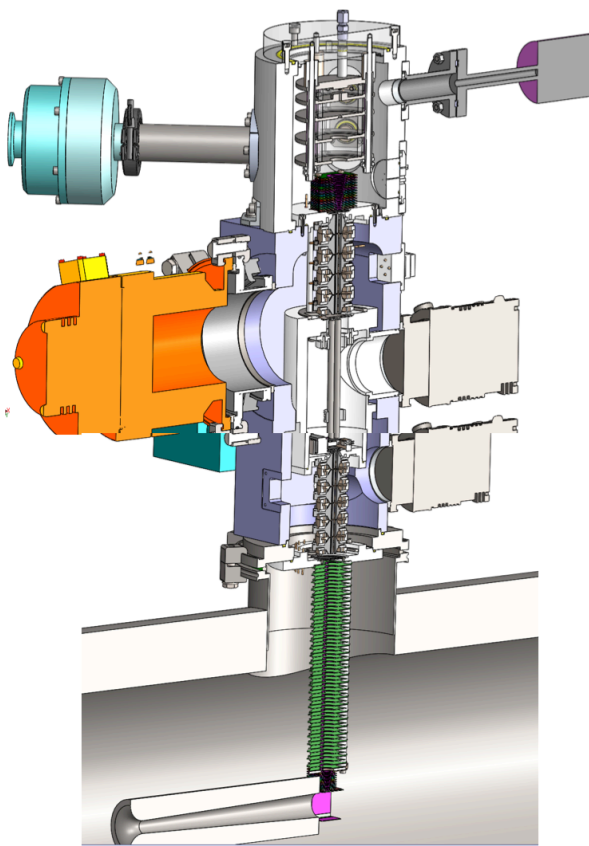
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The astrochemical molecular inventory has recently been enriched with the detection of several anions (C_4H^- , C_6H^- (1), C_8H^- , CN^- (2), C_3N^- , and C_5N^-). So far, the chemical pathways leading to the formation/destruction of these species have hardly been investigated. At the Physics Institute in Rennes, we explore the reactivity (reaction rates, product identities, and branching) of these species by means of uniform supersonic flows issued from specifically designed Laval nozzles, a technique that provides an ideal environment to thermalize gas-phase reactants and products at low temperature (20-30K). (3,4) In this poster, we report on the design considerations of our current instrumental developments regarding a customized, dedicated ion source that enables the injection of significant amounts of mass-selected ions into the dense isentropic core of our uniform supersonic flows. Particular attention is given to reaching the best compromise between mass-selection at low pressure and flow injection at elevated pressure made possible by ion optics simulations in realistic flow fields. Experimental data to characterize transmission efficiency as well as first results on the reactivity of key interstellar anions are also presented.



CAD of the ionization source and radiofrequency transfer line to selectively transmit ions to the reaction chamber and inject them as close as possible to the Laval nozzle exit.

References

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