MILLIMETRE/SUBMILLIMETRE SPECTRA AND INTERSTELLAR SEARCH FOR DEUTERATED METHYL MERCAPTAN, CH_2DSH/CHD_2SH.

HAYLEY A. BUNN, SILVIA SPEZZANO, *The Center for Astrochemical Studies, Max-Planck-Institut für extraterrestrische Physik, Garching, Germany*; L. H. COUDERT, *Institut des Sciences Moléculaires d'Orsay, Université Paris Saclay, CNRS, Orsay, France*; J.-C. GUILLEMIN, *ISCR - UMR6226, Univ. Rennes. Ecole Nationale Supérieure de Chimie de Rennes, Rennes, France*; CHRISTIAN ENDRES, VALERIO LATTANZI, PAOLA CASELLI, *The Center for Astrochemical Studies, Max-Planck-Institut für extraterrestrische Physik, Garching, Germany*.

Deuterium fractionation is an important tool for tracing the chemical history and inheritance of molecules throughout star and planet formation. While there has been an increased focus on the detection of deuterated oxygen-containing complex organic molecules (COMs), the community is yet to identify a deuterated isotopologue of a sulphur-based COM. This leaves many questions related to the formation and evolution of sulphur COMs and their relation to oxygen chemistry unanswered. The simplest sulphur-containing COM is methyl mercaptan, CH_3SH, that has been detected in both low- and high-mass star forming regions with abundances that make the detection of its deuterated isotopologues, plausible[a]. We have collected the millimetre spectrum of CH_2DSH and CHD_2SH from 80 to 500 GHz, which will provide the necessary spectral information for their detection in the interstellar medium (ISM). The spectra, however, are complicated by the hindered torsional rotation of the CH_2D/CHD_2 group. The Hamiltonian needed to account for this unsymmetrical methyl rotor requires an accurate potential which is extracted from far infrared torsional subbands recorded using the high-resolution facilities at the Canadian Light Source and SOLEIL. We have assigned more than 2000 millimetre transitions for the singly deuterated isotopologue including a-type R-branch, b-type Q-branch, and inter-state transitions for all three substates. Additionally, we have identified and begun fitting the doubly deuterated isoptologue. We will present an update on the spectral analysis of these complex spectra, along with our attempts to identify them towards the protostellar region IRAS16293.

[a]Drozdovskaya, M. N., *et al. MNRAS 476.4 (2018): 4949-4964.*