Table 1
Spectroscopic Properties of the Studied Species and Transitions

Species	Transition $J' - J''$	Transition $F' - F''$	Frequency (GHz)	$A_{u,l}$ (s^{-1})	E_u (K)	GREAT Channel	HPBW ($''$)	η_{MB} [a]
ArH$^+$	$1 - 0$	$\cdots$	617.5252(2)	0.0045	29.63	4G1	44.7	0.61
p-H$_2$O$^+$	$3/2 - 1/2$	$\cdots$	604.6841(8)	0.0013	29.20	4G1	44.7	0.61
$N_{K_aK_c} = 1_{1,0} - 1_{0,1}$	$3/2 - 3/2$	$\cdots$	607.2258(2)	0.0062	29.20			
OH$^+$	$2 - 1$	$5/2 - 3/2$	971.8038(15)[b]	0.0182	46.64	4G2	28.8	0.50
($N = 1-0$)		$3/2 - 1/2$	971.8053(15)	0.0152				
		$3/2 - 3/2$	971.91920(10)	0.0030				
SH	$5/2 - 3/2$	$2^+ - 2^-$	1382.9040(1)	0.0005	66.40	4G3	19.3	0.60
$^2\Pi_{3/2}, N = 2$		$3^+ - 2^-$	1382.9086(1)	0.0047				
		$2^+ - 1^-$	1382.9152(1)	0.0042				
		$2^- - 2^+$	1383.2350(1)	0.0005				
		$3^- - 2^+$	1383.2397(1)	0.0047				
		$2^- - 1^+$	1383.2462(1)[b]	0.0042				
OH	$5/2 - 3/2$	$2^- - 2^+$	2514.2987(9)	0.0137	120.75	4G4	11.2	0.52
$^2\Pi_{3/2}, N = 2 - 1$		$3^- - 2^+$	2514.3167(9)[b]	0.1368				
		$2^- - 1^+$	2514.3532(9)	0.1231				
CH	$3/2 - 1/2$	$1^- - 1^+$	2006.74886(6)	0.0111	96.31	LFA	13.5	0.66
$^2\Pi_{3/2}, N = 2 - 1$		$1^- - 0^+$	2006.76258(6)	0.0223				
		$2^- - 1^+$	2006.79906(6)[b]	0.0335				
C II $^2P_{3/2} - {}^2P_{1/2}$	$2 - 1$	$\cdots$	1900.5369(13)	2.32×10^{-6}	91.21	LFA	14.1	0.66
O I $^3P_1 - {}^3P_2$	$2 - 1$	$\cdots$	4744.7775(1)	8.91×10^{-5}	227.76	HFA	6.3	0.65

Notes. The spectroscopic data are taken from the Cologne Database for Molecular Spectroscopy (CDMS; Müller et al. 2005). The H$_2$O$^+$ frequencies were refined considering astronomical observations (see Appendix A of Muller et al. 2016) for which the upper level energies are given with respect to the ground state of p-H$_2$O$^+$ ($N_{K_aK_c} = 1_{0,1}$) and the CH frequencies are taken from Truppe et al. (2014). For the rest frequencies, the numbers in parentheses give the uncertainty in the last listed digit.

[a] The main-beam efficiencies for each channel (and pixel where applicable) are determined for each flight series, listed here are the typical values.

[b] Indicates the hyperfine-structure transition that was used to set the velocity scale in the analysis.