

The Status of Spectroscopic Data for the EChO Mission

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EChO requires a considerable quantity of laboratory spectroscopic data to be successful. Table 1 summarises the molecular spectra anticipated at the time of the original proposal. This presentation will give a detailed update on the status of the data for each species, focusing heavily on the availability of reliable data at higher temperatures. The new data relies heavily on the output of the ExoMol project (www.exomol.com) currently in progress at UCL. This information will be used to construct an EChO-specific spectroscopic database.

Table 1. Main spectral features between 0.4 and 16 μm . The asterisk indicates the molecular/atomic species already detected in the atmospheres of exoplanets. At wavelengths shorter than 2 μm spectroscopic data are often not complete, so that the use of this region is much more difficult for band identification and analysis. The main bands are illustrated in bold.

	0.4-1 μm	1-5 μm	5-11 μm	11-16 μm
<i>R, baseline</i>	300	300	≥ 30	30
<i>R, desired</i>	300	300	300	300
<i>Species</i>				
*H ₂ O	0.51, 0.57, 0.65, 0.72, 0.82, 0.94	1.13, 1.38, 1.9, 2.69	6.2	continuum
*CO ₂	-	1.21, 1.57, 1.6, 2.03, 4.25	-	15.0
C ₂ H ₂	-	1.52, 3.0	7.53	13.7
HCN	-	3.0	-	14.0
C ₂ H ₆	-	3.4	-	12.1
O ₃	0.45-0.75 (the Chappuis band)	4.7	9.1, 9.6	14.3
HDO	-	2.7, 3.67	7.13	-
*CO	-	1.57, 2.35, 4.7	-	-
O ₂	0.58, 0.69, 0.76, 1.27	-	-	-
NH ₃	0.55, 0.65, 0.93	1.5, 2, 2.25, 2.9, 3.0	6.1, 10.5	-
PH ₃	-	4.3	8.9, 10.1	-
*CH ₄	0.48, 0.57, 0.6, 0.7, 0.79, 0.86,	1.65, 2.2, 2.31, 2.37, 3.3	6.5, 7.7	-
CH ₃ D	?	3.34, 4.5	6.8, 7.7, 8.6	-
C ₂ H ₄	-	3.22 , 3.34	6.9, 10.5	-
H ₂ S	-	2.5, 3.8 ...	7	-
SO ₂	-	4	7.3 , 8.8	-
N ₂ O	-	2.8, 3.9, 4.5	7.7, 8.5	-
NO ₂	-	3.4	6.2 , 7.7	13.5
H ₂	-	2.12	-	-
H ₃ ⁺	-	2.0, 3-4.5	-	-
*Na	0.589	1.2	-	-
*K	0.76	-	-	-
TiO	0.4-1	1-3.5	-	-
VO	0.4-1	1-2.5	-	-
FeH	0.6-1	1-2	-	-
TiH	0.4-1	1-1.6	-	-