

SPECTROSCOPIC DATA NEEDS FOR THE ESA SPACE TELESCOPE ARIEL

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The Ariel space telescope is an ESA medium-class science mission due for launch in 2028. The goal of the Ariel mission is to study a large number (~ 1000) of transiting planets, including gas giants, Neptunes, super-Earths and Earth-size planets around a range of host star types using transit spectroscopy in the 1.25-7.8 μm spectral range in order to address the fundamental questions on how planetary systems form and evolve. However, none of this is possible without the necessary atomic and molecular data. While spectroscopic and other data needs for studies of Earth-clone exoplanets are well met by databases constructed for studying our own atmosphere, this is not the case for exoplanets with hot atmospheres. This creates new challenges for providers of spectroscopy data for studies of exoplanets. This presentation will summarise the data needs for atmospheric studies with typical retrieval and modelling codes and with the particular relevance for the Ariel space mission.

The molecular and atomic data used in the exoplanetary retrievals are usually produced in the form of cross-sections or k-tables, which in turn require molecular and atomic line lists, line shapes, UV photo-absorption data, collision induced absorption (CIA) data, data for aerosols, data required for atmospheric chemistry models (e.g. reaction rates) as well as opacity calculators and databases which provide such data. We will give an overview of the current data status in terms of their 1) availability, 2) typical usage, 3) needs and 4) what is currently being worked on, see the dedicated GitHub data portal of the Ariel Working group “Spectroscopic Data” at <https://github.com/Ariel-data>. Although the focus is on the data required for characterising exoplanet atmospheres related to the Ariel space mission, this is also relevant to more general data usage in the field.