The search for exoplanet molecules

To date, almost 4000 exoplanets have been discovered, with many more expected. It is estimated that there is at least one exoplanet orbiting every star in our galaxy. Studying the composition of exoplanet atmospheres is a relatively new field of astrophysics, which has been developing fast since the confirmed detection of the first exoplanet, around 30 years ago. Many of these planets have high-temperature atmospheres, making laboratory data measured on earth incompatible for use in characterising them. Theoretical methods need to be used instead. The ExoMol (Exoplanet Molecules) project was therefore set up in 2011 in order to create a database of linelists for all molecules of astrophysical importance, for use in characterising exoplanet or stellar atmospheres up to high temperatures. These linelists can be used to create molecular spectra to compare against observed spectra of exoplanet/star systems, as will be explained in this talk. A new ExoMol linelist for C2H2 was recently calculated as part of my PhD, which is valid up to temperatures of 1500K. The applications of this data will be discussed, as well as some more general results and methods in the search for molecules in exoplanetary atmospheres.