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Variations in the 3.3 μm feature with galactic environment

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A significant fraction of the carbon budget in our galaxy is expected to exist in the form of polycyclic aromatic hydrocarbons (PAHs), and therefore the study of PAH formation and growth is very important to our understanding of carbon in the galaxy. The distribution of this carbon also has implications for other fields such as the study of interstellar dust, unexplained astronomical phenomena such as the diffuse interstellar bands and anomalous microwave emission, and astrobiology. This talk will discuss how variations in PAH morphology can affect molecular emission lines found in the 3 μm region of astronomical spectra, including the 3.3 μm feature widely attributed to C–H stretches in aromatic hydrocarbons. Of particular interest is the contrast between the observed 3.3 μm and 3.28 μm features, which can be used to determine information about the edge structures present in the population of PAHs being observed. Variation in this spectroscopic region will be analysed in terms of PAH growth and evolution. Using a combination of quantum chemistry techniques and spectroscopic analysis, the use of observational data from the AKARI space telescope can be used to investigate variations in the morphology of PAHs in different galactic environments at varying degrees of galactic latitude, investigating sight lines towards dark clouds, HII regions, and the galactic centre.