

[IM03] Spatial variation of PAH emissions: the degree of ionisation

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We observed mid-infrared spectra of the Red Rectangle proto-planetary nebula as a function of the distance from the centre along the SE-NW whisker in 2001. The emission bands at 7.7, 8.6, 11.3 and 12.7 μm appear and the spatial evolution of these emissions has been recorded from the on-star position towards the outer nebula. The data were recorded at UKIRT using MICHELLE with a resolving power of 200. We have presented data last time of the meeting and new analysis is presented.

The spatial variation of the intensity ratio of the 8.6 μm to 11.3 μm features is presented and decreases moving away from the central illuminating star. We compare the observed intensity ratio of the Red Rectangle spatially with the ionisation equilibrium model dependent on UV strength. It showed more ionised PAHs (Polycyclic Aromatic Hydrocarbons) are expected to exist near the centre than the outer nebula.

We suggest that there is another possibility to explain the intensity variation of the 8.6 μm to the 11.3 μm feature; dehydrogenated PAHs in addition to ionised ones. Model spectra of dehydrogenated PAHs have been calculated using density functional theory using the commercial package, QChem 2.0, and this shows enhancement of the intensity of the C-C stretching modes relative to the C-H out-of-plane bending modes. The strengthening of the features in the range 6 - 9 μm region could be due to dehydrogenated PAHs in addition to ionised species.

[IM04] Molecular Clouds with a peculiar velocity structure
in the Local Arm of the second quadrant강미주^{1,2}, 이영웅²¹충남대학교, ²한국천문연구원

We have selected a cloud complex located at ($l = 117^\circ \sim 124^\circ$, $b = -3^\circ \sim 5^\circ$) from the 12CO Outer Galaxy Survey database; this complex apparently shows a peculiar velocity structure protruding from the Local Arm. We divide this complex into 7 individual clouds and derive the several physical parameters including velocity dispersions and masses. We delineate their velocity structure and study the various external sources for a peculiar velocity field. Star forming activities are clearly going on as there are several outflows and IRAS point sources, which could be embedded young stellar objects, are associated. Large clouds may be marginally in gravitational equilibrium because their centroid velocity dispersions are larger than their internal velocity dispersions and their virial mass estimates are a few larger than the mass estimates using CO luminosities. We estimate total mass of the molecular complex to be $9.6 \times 10^4 M_\odot$, using a conversion factor from CO luminosity.