# DIFFUSE [C II] EMISSION IN THE GALAXY

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An extensive survey of [C II] line emission at 158 microns using the balloon borne telescope (BICE) has provided a complete map of the emission intensity distribution in the first and the fourth quadrants of the galactic plane ($280° < l < 80°$, $-5° < b < 5°$: Okuda et al. 1993). The emission is very extended throughout the galactic plane in which three intensity maxima are seen towards the tangential directions of the Scutum and the Norma arms as well as in the Galactic center region. However the Galactic center maximum is much less prominent compared with the two other distributions, unlike the case of far infrared continuum and CO emissions.

It has been previously shown that the [C II] emission is well correlated with FIR emission as well as CO (J = 1 – 0) emission (Stacey et al. 1991, Crawford et al. 1985). However, our observations show that the correlation varies from place to place. In Fig. 1, the correlations are plotted on the [C II]/FIR vs CO/FIR diagram used by Wolfire (1985) in his PDR emission model. As noted in the figure, the distribution of dots is highly dispersive and changes collectively from region to region. Some points are evidently spread out in the region where his model cannot explain, in particular, the points of the Cyg-X region are mostly present in the forbidden region. This should mean that the emission mechanism of [C II] line cannot be explained simply by the standard PDR model so far proposed. Doi et al. (1994) has shown that the emission from ionized gas should be dominant in the Cyg-X region. The noticeable depression of [C II]/FIR ratio in the Galactic center is explained partly by the additional heating of dust by low temperature star light which supplies extra FIR emission but not effective for ionization of carbon atoms. It should be partly caused by self-shielding



*L. Blitz and P. Teuben (eds.), Unsolved Problems of the Milky Way*, 497–498.

of photodissociation region (Nakagawa et al. 1994). It is also interesting to remark that the distribution of [C II] emission in the Galactic center region is very similar to that of thermal radio continuum emission. This would indicate a substantial part of the emission is generated in ionized gas clouds. On the other hand, Yamashita et al. (1994) has shown the emission in the rho-Oph region is mostly generated in the region where B-stars are dominant UV sources.

In conclusion, our high resolution observations have resolved the locality of the diffuse [C II] line emission and suggested a large variety of its emission mechanisms.

One of the authors (HO) would like to dedicate this paper to Prof. Oort remembering his kind guidance and encouragement given in his stay at Leiden observatory more than twenty years ago.

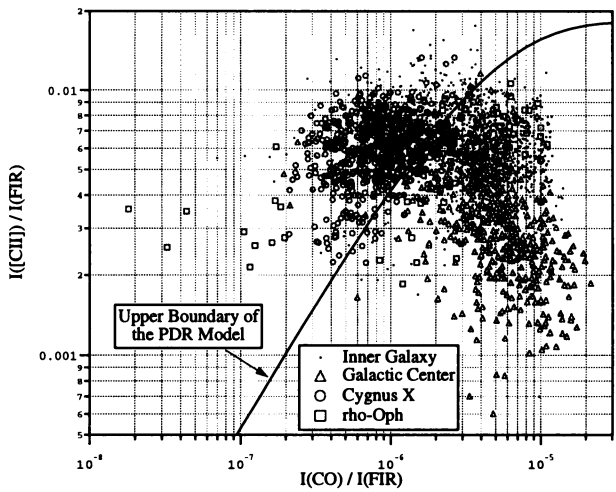


*Figure 1.*

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