## HCN (J=1-0) Survey of Molecular Clouds in the Galactic Center Region

Lee, Chang Won
Department of Earth Science, Pusan National University

We have observed molecular clouds in the Galactic Center Region of $-6^\circ \leq l \leq 6^\circ$ and $-0.7^\circ \leq b \leq 0.9^\circ$ with HCN (J=1-0) line (88.63 GHz),which is optically thin almost everywhere, on a 4′ grid using the 14 m telescope of the Daeduk Radio Astronomy Observatory. The integrated intensity maps binned to 100 km $s^{-1}$ range show the existence of many clouds having highly forbidden velocity in the Galactic Center region. We have made $l$-$v$ diagrams for each $b$ as well as the averaged one over b, to describe the velocity structures of the clouds. Our $l$-$v$ diagrams are similar to those of $^{13}CO$, but there are some different features as the HCN line trace higher density regions ($\sim 3\times10^5$ $cm^{-3}$) than the $^{13}CO$ line. We also have observed some strong HCN emitting regions with optically thinner $H^{13}CN$ line to derive HCN column densities. Estimated HCN column densities range from $\sim 10^{15}$ $cm^{-2}$ to $\sim 10^{17}$ $cm^{-2}$.

## THERMAL AND NON-THERMAL RADIO CONTINUUM SOURCES IN THE W51 COMPLEX

Dae-Sik Moon and Bon-Chul Koo
Department of Astronomy, Seoul National University

We have decomposed the 11-cm radio continuum emission of the W51 Complex into thermal and non-thermal components. The distribution of the thermal emission has been determined by analyzing H I, CO, and IRAS 60-$\mu$m data. We have found a good correlation between the 11-cm thermal continuum brightness temperature $T_{11,th}$ (K) and the 60-$\mu$m surface brightness of ionized region $I_{60,ion}$ (MJy $sr^{-1}$), $T_{11,th} = (7.9\ ^{+2.1}_{-1.6}) \times 10^{-3}\ I_{60,ion}$. Most of the thermal continuum is emanating from the compact H II region and the low-density ionized envelopes of W51A and W51B. All the H II regions, except G49.1-0.4 in W51B, have associated molecular clumps. The absence of a molecular clump in G49.1-0.4 may be related to the high-velocity H I gas discovered by Koo & Heiles (1991) in this region. The thermal radio continuum fluxes of the compact H II regions have a good correlation with the masses of molecular clumps. This may indicate that the masses of the newly formed stars are proportional to those of the parential clouds.

According to our result, there are three non-thermal continuum sources in W51: G49.5-0.4 in W51A, a point source near G49.1-0.4 in W51.B, and the shell-like source W51C. The non-thermal flux of G49.5-0.4 at 11-cm is 23 Jy, which is 30% of the 11-cm thermal flux. The existing data between 150 MHz and 300 GHz seems to indicate the coexistence of the thermal and non-thermal components in G49.5-0.4. The nature of the non-thermal source near G49.1-0.4 is unknown. The source has a flux of 9 Jy at 11-cm. The physical associations of this non-thermal source either with the nearby X-ray emission and/or the high-velocity H I gas needs to be studied.