R15a ALMA CO-observations of starburst-driven molecular outflow in NGC1482

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Galactic outflows are an important component of the evolution of galaxies. Driven by starburst activities, the outflows can transport metal-enriched interstellar medium (ISM) into the circumgalactic medium (CGM), hence contribute to regulate the star formation in galaxies. Molecular gas as the fuel of star formation is widely distributed in galaxies and expected to be detected outside the galactic plane where outflows may exist. In order to understand the properties of the outflows and theirs influence on the evolution of galaxies, it is important to image outflows of molecular gas and derive the physical properties in the outflows.

In this work, we report on high-resolution($\sim 1''$) observations of the nearby (20 Mpc) edge-on disk galaxy NGC1482 in multiple CO lines, namely, ^{12}CO($J = 2 \rightarrow 1$), ^{13}CO($J = 1 \rightarrow 0$), and C^{18}O($J = 1 \rightarrow 0$), carried out by the Atacama Large Milimeter/submilimeter Array in cycle 7. A biconical molecular outflow is detected by ^{12}CO($J = 2 \rightarrow 1$) line, extending over 1.5 kpc perpendicular to the disk, which is consistent with previous study by ^{12}CO($J = 1 \rightarrow 0$) line (Salak et al.2020). The distribution of CO exhibits approximately a symmetrical cylinder around the warm and high-temperature gas outflow traced by Hα and soft X-rays. We measured the CO line ratios R_{21} =^{12}CO($J = 2 \rightarrow 1$)/^{12}CO($J = 1 \rightarrow 0$) and $R_{12/13}$ =^{12}CO($J = 1 \rightarrow 0$)/^{13}CO($J = 1 \rightarrow 0$) using whole-disk CO maps. We find the R_{21}, $R_{12/13}$ in galactic disk and center to be $\sim$ 0.6-0.7, 15-20 and 1, 12, R_{21} also obtained in outflow region $\sim$0.5. Combining R_{21} and $R_{12/13}$,we modeled the outflows physical conditions using the radiative transfer tool RADEX.