R14b Structure and Kinematics of CO (J=2-1) Emission in the Central Region of NGC 4258

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We present ^{12}CO (J =2-1) observations towards the central region of the nearby Seyfert 2 galaxy NGC 4258 with the Submillimeter Array (SMA). NGC 4258 is well known to exhibit a sub-pc-scale molecular disk as traced by H_2O maser emission. The major axis of the molecular disk is along the east-west direction although the P.A. of the host galaxy is around -30° and the angle between the two rotation axes of the sub-pc-scale disk and the galactic disk is $\sim 120^\circ$. This indicates a significant misalignment between the axes of rotation for the entire galaxy and for the nuclear disk. Until now, the morphological and kinematical connections between the host galaxy and the nuclear disk have not been elucidated. Our interferometric maps show two arm-like elongated components along the major axis of the galaxy, with no strong nuclear concentration. The CO (2-1) morphology and kinematics are similar to previous CO (1-0) results. The velocity field of the components agrees with the general galactic rotation, except for the east elongated component, which shows a significant velocity gradient along the east-west direction and deviate from the galactic rotation curve. In order to account for the velocity field, we propose the kinematical model where the warped rotating disk is also expanding. The line ratio of CO(2-1)/CO(1-0) reveals that the eastern component with the anomalous velocity gradient appears to be warmer and denser. This is consistent with the gas in this component being closer to the center, being heated by the central activities, and possibly interacted by expanding motions from the nuclear region.