AN ANISOTROPIC GAS JET FROM THE NUCLEUS OF THE GALAXY

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Molecular hydrogen of $\gtrsim 10^8 M_\odot$ exists in the galactic center region as has been revealed by recent observations of molecular emission lines. In the inner region of $|\ell| \lesssim 3°.0$, most of the dominant emission features are located at $0°.0 \lesssim \ell \lesssim 2°.0$ and 0 km $s^{-1} \lesssim v \lesssim 100$ km s^{-1} extremely unevenly with respect to the galactic center. As a model of the molecular complex we propose a fan of 360 pc radius whose pivot is at the nucleus. The vertical angle of the fan is about 50° and the central line of the fan makes an angle of about 60° to the line of sight. Molecules in the fan are radially outflowing from the center with the velocity of 110-140 km s^{-1}. The l-v pattern of the fan model agrees very well with the observational data. As for Sgr A and Sgr B2 numerical calculation of molecular line profiles has been made by using the large velocity gradient approximation. The calculation shows that the broad and asymmetric line profiles in the complex are well reproduced in the fan model. Further, an isotope effect on line shape is predicted, which will be viable for an observational check of the model.

The origin of the molecular fan is most directly interpreted in terms of anisotropic mass ejection from the center. Similar fan-like features are found by optical observers in external galaxies. The total kinetic energy of the complex amounts to $\gtrsim 10^{55}$ erg; the characteristic duration of the phenomenon is estimated to be about 3×10^6 yr. At $\ell \sim 1°.3$ the complex shows an enormous thickness of about 140 pc, suggesting a past active phase of the nucleus.

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