

R25a Feeding and feedback of star formation in NGC 1808 revealed with ALMA

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We present CO(1-0) and 2.8-mm continuum observations of the galaxy NGC 1808 carried out with the Atacama Large Millimeter/submillimeter Array (ALMA) as part of our cycle 1 project. NGC 1808 is a nearby (11 Mpc), barred starburst galaxy with polar dust lanes from the nuclear 500-pc region associated with a gas outflow. Our observations, that include the extended 12-m array and Atacama Compact Array (ACA) data, reveal five distinct components of molecular gas are revealed at $2''$ (100 pc) resolution: (1) compact (< 200 pc), warped circumnuclear disk (CND) with high gas surface density ($10^3 M_{\odot} \text{ pc}^{-2}$) and mass $M(R < 250 \text{ pc}) > 1.4 \times 10^8 M_{\odot}$, (2) nuclear spiral arms within 100 and 400 pc from the CND, (3) 500-pc ring, (4) gas-rich galactic bar (radius $a_b \simeq 3$ kpc), and (5) global spiral structure. There is also evidence for extraplanar gas ejected from the CND region. The bar pattern speed is derived to be $56 \pm 11 \text{ km s}^{-1} \text{ kpc}^{-1}$ with corotation at $r_{\text{CR}} \simeq 3.2$ kpc and $r_{\text{CR}}/a_b \simeq 1.1$. The central rotation curve is derived using tilted-ring modeling and decomposed into a bulge and a core. There are two distinct systemic velocities: 998 km s^{-1} in the CND (< 200) pc and 964 km s^{-1} on the global scale. Between the CND and the 500-pc ring, a spiral arm is discovered associated with streaming motions. Radio continuum at 2.8 mm was detected at the galactic core and a number of discrete circumnuclear sources. The core is dominated by non-thermal emission with spectral index $\alpha = -1$ at 2.8 mm.