Detection of a High Brightness Temperature Radio Core in the AGN-driven Molecular Outflow Candidate NGC 1266

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We present new high spatial resolution Very Long Baseline Array (VLBA) continuum observations of the Active Galactic Nucleus (AGN)-driven molecular outflow candidate NGC 1266. Although other well-known systems with molecular outflows may be driven by star formation in a central molecular disk, the molecular mass outflow rate reported in Alatalo et al. (2011) in NGC 1266 of 13 $M_{\odot}$ year^{-1} exceeds star formation rate estimates from a variety of tracers. This suggests that an additional energy source, such as an AGN, may play a significant role in powering the outflow. Our VLBA observations at 1.65 GHz reveal one continuum source within the densest portion of the molecular gas, with a diameter $d < 8$ mas (1.2 pc), a radio power of 1.48×10^{20} W Hz^{-1}, and a brightness temperature $T_{\rm b} > 1.5 \times 10^{7}$ K that is most consistent with an AGN origin. The radio continuum energetics implied by the compact VLBA source, as well as archival Very Large Array (VLA) continuum observations at lower spatial resolution, further support the possibility that the AGN in NGC 1266 could be driving the molecular outflow. We also present new High Sensitivity Array data, which probes spatial scales intermediate to those observable by existing VLA and VLBA data. In summary, our findings suggest that even low-level AGNs may be able to launch massive outflows in their host galaxies.