R04a ALMA discovers a starburst-driven molecular outflow in NGC 1482

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Galactic outflows are important mechanisms in the regulation of star formation. The outflows consist of multiphase gas and dust that are launched from galaxies into the circumgalactic medium as part of a process known as the baryon cycle. To understand the properties of outflows and their impact on galaxy evolution, it is important to image all phases of the interstellar medium, and especially the molecular gas, which is the fuel for star formation. In this presentation, we report on the first high-resolution ($\approx 1''$ or 100 pc) observations of the nearby early-type starburst galaxy NGC 1482 in ^{12}CO ($J = 1 \rightarrow 0$) carried out by the Atacama Large Millimeter/submillimeter Array in cycle 7. Molecular gas traced by CO is detected in a highly inclined ($i = 76^{\circ}$), rotating disk, and a biconical outflow extending at least 1.5 kpc perpendicular to the disk. CO is distributed approximately as a cylindrically symmetrical envelope around the warm and hot gas outflow traced by Hα and soft X-rays. We calculated the outflow velocity, mass outflow rate, and kinetic energy to be $v_{\rm out} \sim 100$ km s^{-1}, $\dot{M}_{\rm out} \sim 7\ M_{\odot}$ yr^{-1}, and $E_{\rm out} \sim 7 \times 10^{54}$ erg. Although the mass outflow rate is larger than that of ionized gas, the outflow velocity is significantly lower than the escape velocity. Furthermore, we find evidence of molecular clouds raining down onto the disk, possibly from a galactic fountain. On the other hand, $\dot{M}_{\rm out}$ is larger than the star formation rate by a factor of ~ 2, indicating a temporary suppression of star formation. The outflow energetics and the absence of an active galactic nucleus suggest that the outflow is starburst driven.