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# The VLA view on the clumpy molecular shells of CW Leo

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## Abstract

The carbon-rich AGB star CW Leo has a high mass-loss rate, is nearby ( $\sim 130$  pc), and is one of the most important chemical laboratories in astronomy. The star has been proposed to have a binary companion which largely impacts the hydrodynamical shaping and chemistry of the circumstellar envelope (CSE). The combined effects of dynamics and chemistry are not well understood. We have obtained a new spectral and imaging survey of CW Leo at cm-wavelengths using the Jansky Very Large Array (VLA). The molecular distribution in the outer CSE is traced in unprecedented detail with a sensitivity of  $\sim 1$  mJy and a resolution of  $\sim 1$  arcsec. Numerous transitions of cyanopolyynes and carbon chains are detected which probe the region of UV-photon induced chemistry. Our spatio-kinematical analysis provides a detailed empirical description of this narrow density-enhanced region which consists of shells, arcs, and clumps and clearly shows asymmetries. Our analysis emphasises that the complex morphology greatly affects the photochemical properties of the CSE. This has to be taken into account in future studies to approach a global understanding of CSEs in general.

**Keywords:** astrochemistry, circumstellar matter, circumstellar envelope, molecular lines, imaging, AGB star, density, enhancements, asymmetries, shaping

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