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Deciphering the Star Formation Status of the Musca Molecular Cloud Filament

The Chamaeleon cloud complex is active in star formation hosting hundreds of newly born stars. Yet the adjacent Musca cloud, filamentary in shape, seem to be barren, with only a few dense cores detected, signifying the cloud being prestellar. While a far-infrared source, IRAS 12322-7023, on the basis of its IRAS colors, was reported in the literature as a T Tauri candidate, i.e., a newly formed star, it was later re-classified as an asymptotic giant branch (AGB) star, namely an evolved object with a He exhausted core, plus H and He burning shells, although the characteristic 1612-MHz OH maser line has not been detected. Analysis based on the latest Gaia photometry and astrometry detects no young population in the cloud, and IRAS 12322-7023 is too faint for Gaia. Here we diagnose its proper motion derived from 2MASS and ALLWISE, and Spitzer images, using neighboring bright stars with Gaia measurements as astrometric references. Our diagnosis will address whether there is a full-grown star in the cloud, indicative of ongoing star-forming activity, and if so, a possible link with the star formation history in the nearby Chamaeleon region.

Section

Star Formation

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