Triggered Star Formation around IR Bubble G24.136+00.436

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Abstract

With infrared and radio data, we have carried out comprehensive investigations into a bubble G24.136+00.436. Observations of CO and its isotopologues (1-0) reveal shocked and quiescent gas. The shocked gas is characterized by non-Gaussian and broad-line profiles, indicating that ambient material around the bubble is strongly affected by feedbacks from massive stars. In the southeast, the quiescent gas appears as a shell-like layer and condenses into five cores. They are massive, dense, and gravitationally bound. Three of them have a high probability of forming high-mass stars. A potential exciting star of the bubble has been identified with a spectral type of O8.5V-O8.0V. There are ~ 70 candidates of young stellar objects (YSOs), including three massive Class I protostars which will grow as massive as $8-15\ \mathrm{M}_{\odot}$. They are very young with ages of a few 10^4 yr. The majority of YSOs are distributed along the edge of the bubble; a tendency of age decrease of YSOs from the exciting star is tentatively detected; the cores are regularly separated; and the column density of the shell is up to $2.4\times10^{22}\ \mathrm{cm}^{-2}$. All these features are suggestive of a scenario of triggered star formation. With the comparison of models by previous authors, we suggest that the collect and collapse process functions through a combination of the expanding HII region and stellar winds.