Study unveils the nature of young stars near the cometary globule CG 30

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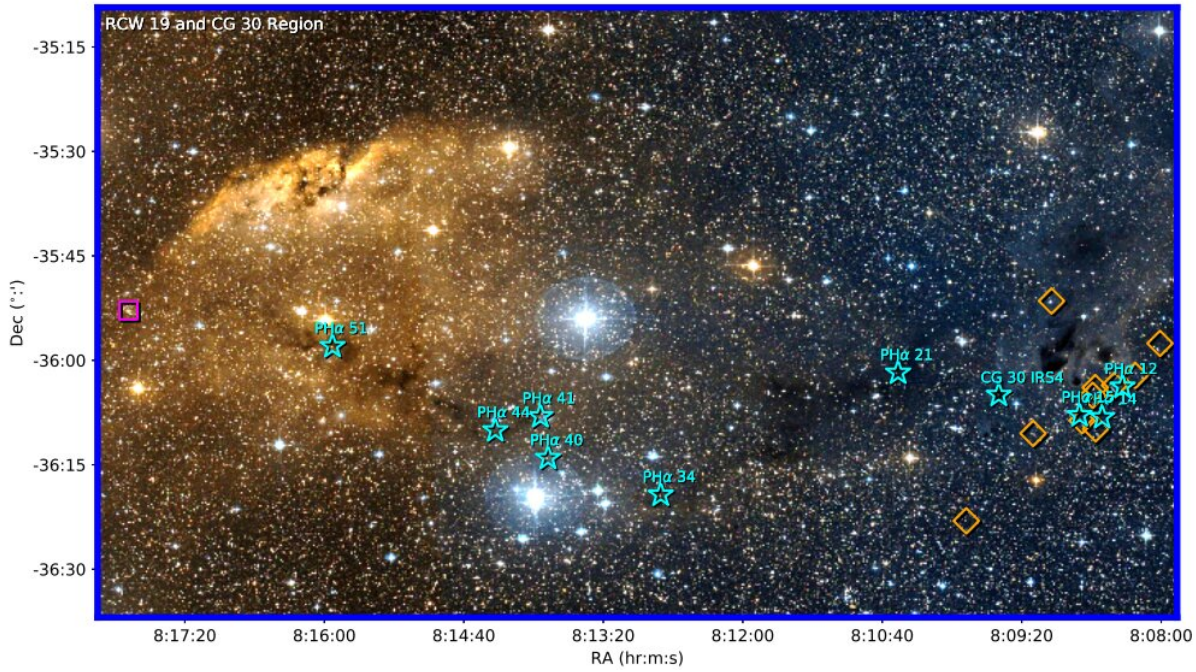

RCW 19 and CG 30 region. Credit: Yep & White, 2019.

Using the High-Resolution Echelle Spectrometer (HIRES), astronomers from Georgia State University (GSU) in Atlanta have investigated the nature of young stars near the cometary globule CG 30. The new study, presented December 20 on arXiv.org, provides important information about the properties of 21 young stars in this area.

Cometary globules (CGs) are isolated, faint, relatively small clouds of gas and dust in the Milky Way galaxy. In CGs, massive stars irradiate surrounding cloud cores, which results in envelopes resembling comet tails. Observations show that CGs are often birthplaces of stars, and many harbor very young stars in their heads.

CG 30 is located in the Gum Nebula—an extensive region of ionized interstellar atomic hydrogen (HII region) known to contain at least 32 cometary globules. GSU's Alexandra Yep and Russell White took a closer look at stellar populations and star formation process in this area. For this purpose, they employed the HIRES instrument at the Keck I telescope in Hawaii and analyzed the available archival data from other studies.

"We have conducted a high-dispersion (R ~ 34,000) optical spectroscopic study of 10 young stars near the cometary globule CG 30 in the Gum Nebula. (...) Using our measurements, previous spectroscopy, and previous photometry of 11 other young stars in the area, we determine stellar, kinematic and accretion properties of a total of 21 young stars," the astronomers wrote in the paper.

The research found that eight of the 21 young stars are classical T Tauri stars, and three of them are associated with CG 30. Spectral types of 10 stars from the sample were found to range from M4.5 to K5, while their rotational velocities were calculated to be between 6.3 and 27.8 km/s.

The astronomers noted that one star, designated CG 30 IRS 4, is of special interest. It has the lowest rotational velocity from all the studied objects (6.3 km/s), is inside the cometary globule and appears to be an embedded T Tauri star. However, the star's hydrogen-alpha 10 percent width (of about 225 km/s) falls below the classical T Tauri star limit. It also exhibits moderate veiling, and is probably still accreting. Therefore, further observations of CG 30 IRS 4 are needed to disclose its true

nature.

Furthermore, the researchers added that 14 stars of the sample are likely related to each other and to the GC 30 association (together with cometary globules GC 31 and GC 38). This assumption is based on the data that show that these stars are located at a similar distance of approximately 1,167 light-years, are less than 1 million years old, and showcase similar kinematics (radial velocity, proper motions and 1-D dispersion).

In concluding remarks, the authors of the paper noted that the whole CG 30 association has an accretor fraction of approximately 29 percent. This value is relatively low when compared to young quiescent clusters, but consistent with young irradiated clusters.

More information: Young Stars near Cometary Globule CG 30 in the Tumultuous Gum Nebula, arXiv:1912.09677 [astro-ph.SR] arxiv.org/abs/1912.09677

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