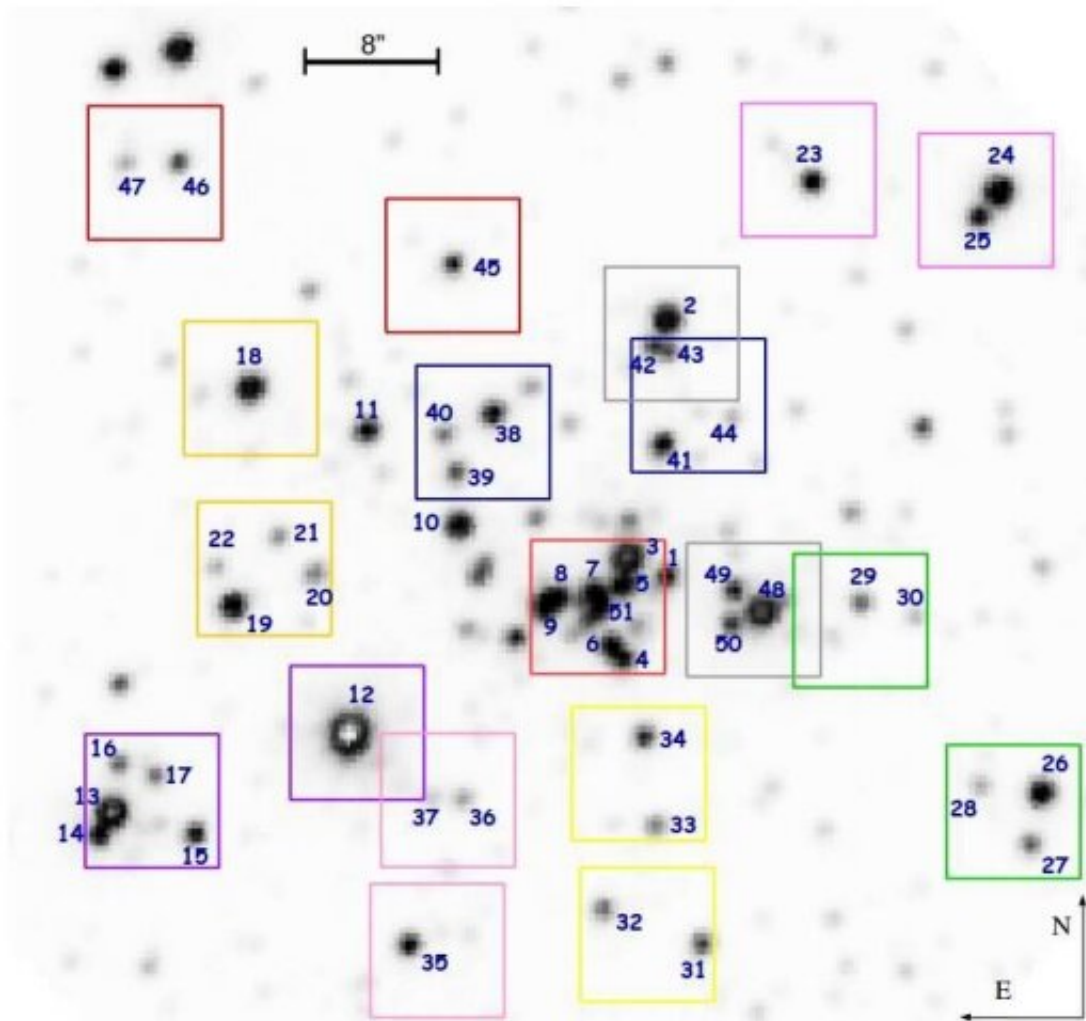


# Astronomers detect new massive stars in the young cluster VVV CL074

July 15 2019, by Tomasz Nowakowski



K-band image of VVV CL074 from the VVV survey. Observed fields (squares) and stars identifiers are overplotted. Squares of the same color correspond to the same observing block. The size of the observed fields is 8", corresponding to a linear distance of about 0.4 pc at the estimated cluster distance (10.2 kpc). Image credit: Martins et al., 2019.

Using ESO's Very Large Telescope (VLT), an international team of astronomers has investigated a population of massive stars in the young cluster VVV CL074. The observations resulted in disclosing fundamental properties of 25 stars, out of which 19 were identified for the first time. The findings were presented in a paper published July 4 on arXiv.org.

Massive stars evolve into different types of objects depending on their initial mass. However, many aspects of this process remain unknown as the evolution of massive stars is still not fully constrained. One of the methods that could be helpful in resolving these uncertainties is the study of young, massive clusters hosting various populations of massive stars.

So a group of astronomers led by Fabrice Martins of the University of Montpellier, France, performed observations of a massive young cluster known as VVV CL074. For this purpose, they used the Spectrograph for INtegral Field Observations in the Near Infrared (SINFONI) instrument on VLT.

"In the present paper, we describe new spectroscopic observations of the young massive cluster VVV CL074. Using integral-field spectroscopy, we characterize the spectral properties of the brightest members and identify new OB and WR [Wolf-Rayet] stars," the astronomers wrote in the paper.

In general, the team has investigated the presence of hydrogen, helium, and sometimes carbon and nitrogen lines in the K-band spectra of 25 massive stars in VVV CL074. The results show that 19 of the studied objects are newly discovered stars. Fifteen of the newfound stars are most likely the members of the cluster, while the remaining four were classified as foreground stars.

From the sample of the 25 studied objects, three of them were found to be WR stars, while the rest turned out to be O and B stars. Besides these stars, the astronomers additionally identified 21 objects with spectra exhibiting strong carbon monoxide absorption.

According to the study, the distance to VVV CL074 was calculated to be about 33,000 light years, which makes it one of the farthest young massive clusters identified to date. The astronomers estimate that most of the stars in the sample are between 3 and 6 million years old. They also found that the initial mass of two WR stars (designated WN8 and WC9) was apparently between 40 and 60 [solar masses](#).

By comparing the results with properties of other similar clusters in the Milky Way galaxy, the researchers drew final conclusions that could improve our understanding of evolutionary pathways of [massive stars](#).

"The central [cluster](#) of the galaxy is older than VVV CL074. Its WR population comes from stars with lower initial masses compared to the progenitors of the WR stars in VVV CL074. WN8 and WC9 stars being present in both clusters, this shows that such spectral types are encountered during the evolution of stars with a range of initial masses," the authors of the paper concluded.

**More information:** F. Martins et al, Massive stars in the young cluster VVV CL074 arXiv:1907.02357

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