

# Stellar family portrait takes imaging technique to new extremes

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This impressive image of the open cluster known as Trumpler 14 was obtained with the Multi-conjugate Adaptive optics Demonstrator mounted on ESO's Very Large Telescope. The cluster, which is found to be only 500 000 years old -- a blink of an eye in the Universe's history -- resides at the outskirts of the central region of the Carina Nebula, located some 8000 light-years away towards the constellation of Carina (the Keel). Trumpler 14 is not only the youngest, but also one of the most populous clusters within the nebula. Astronomers counted about 2000 stars in the very central parts of this cluster. The MAD instrument allows astronomers to obtain very sharp images over a wide area and this image is the adaptive optics image that so far covers the widest area on the sky. The field of view is about 2 arcminutes across and the image is based on data obtained through two different filters (K and H). Credit: ESO/H. Sana

Noted for harbouring Eta Carinae -- one of the wildest and most massive stars in our galaxy -- the impressive Carina Nebula also houses a handful of massive clusters of young stars. The youngest of these stellar families is the Trumpler 14 star cluster, which is less than one million years old -- a blink of an eye in the Universe's history. This large open cluster is located some 8000 light-years away towards the constellation of Carina (the Keel).

A team of astronomers, led by Hugues Sana, acquired astounding images of the central part of Trumpler 14 using the Multi-conjugate Adaptive optics Demonstrator (MAD) mounted on ESO's Very Large Telescope (VLT). Thanks to MAD, astronomers were able to remove most of the blurring effects of the atmosphere and thus obtain very sharp images. MAD performs this correction over a much larger patch of the sky than any other current [adaptive optics instrument](#), allowing astronomers to make wider, crystal-clear images.

Thanks to the high quality of the MAD images, the team of astronomers could obtain a very nice family portrait. They found that Trumpler 14 is not only the youngest — with a refined, newly estimated age of just 500 000 years — but also one of the most populous star clusters within the nebula. The astronomers counted about 2000 stars in their image, spanning the whole range from less than one tenth up to a factor of several tens of times the mass of our own Sun. And this in a region which is only about six light-years across, that is, less than twice the distance between the Sun and its closest stellar neighbour!

The most prominent star is the supergiant HD 93129A, one of the most luminous stars in the Galaxy. This titan has an estimated mass of about 80 times that of the Sun and is approximately two and a half million times brighter! It makes a stellar couple — a [binary star](#) — with another bright, massive star. The astronomers found that [massive stars](#) tend to pair up more often than less massive stars, and preferably with other

more massive stars.

The Trumpler 14 cluster is undoubtedly a remarkable sight to observe: this dazzling patch of sky contains several white-blue, hot, massive stars, whose fierce ultraviolet light and stellar winds are blazing and heating up the surrounding dust and gas. Such massive stars rapidly burn their vast hydrogen supplies — the more massive the star, the shorter its lifespan. These giants will end their brief lives dramatically in convulsive explosions called supernovae, just a few million years from now.



This image of the Carina Nebula shows the position of the Trumpler 14 cluster of stars.

A few orange stars are apparently scattered through Trumpler 14, in charming contrast to their bluish neighbours. These orange stars are in fact [stars](#) located behind Trumpler 14. Their reddened colour is due to absorption of blue light in the vast veils of dust and gas in the cloud.

The technology used in MAD to correct for the effect of the Earth's

atmosphere over large areas of sky will play a crucial role in the success of the next generation European Extremely Large Telescope (E-ELT).

More information: This research has been presented in a paper submitted to *Astronomy and Astrophysics* ("A MAD view of Trumpler 14", by H. Sana et al.). Research paper — [staff.science.uva.nl/~hsana/research\\_tr14.html](http://staff.science.uva.nl/~hsana/research_tr14.html)

Source: ESO ([news](#) : [web](#))

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