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PRESS RELEASE

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A jet of molecular hydrogen arising from a forming high-mass star

Based on the article "Formation of a massive protostar through disk accretion. II. SINFONI integral field spectroscopy of the M17 silhouette disk and discovery of the associated H_2 jet", by Nürnberger et al.

To be published in *Astronomy & Astrophysics*

A team of European astronomers offer new evidence that high-mass stars could form in a similar way to low-mass stars, that is, from accretion of gas and dust through a disk surrounding the forming star. Their article, published in *Astronomy & Astrophysics*, reports the discovery of a jet of molecular hydrogen arising from a forming high-mass star located in the Omega nebula (M17). This detection confirms the hypothesis based on their earlier discovery that this forming high-mass star is surrounded by a large accretion disk.

While astronomers now understand the overall process of low-mass star formation very well, the formation process of massive stars is still very much under debate. Recent astronomical observations suggest that high-mass stars [1] could form through accretion processes, just like low-mass stars do. For instance, in 2004, European astronomers discovered a large accretion disk that probably surrounds a forming high-mass star, in the star-forming region M17, also known as the Omega nebula and located at a distance of about 7000 light years [2].

Looking again at M17 with the new spectrograph SINFONI [3] at the ESO-VLT, the same European group [4] report discovering a jet of molecular hydrogen (H_2) that apparently arises from the forming high-mass star. The picture below illustrates this discovery, which is being published in *Astronomy & Astrophysics*.

The ejection of material through a jet or an outflow is always linked to accretion of gas and dust, either onto the circumstellar disk or onto the central protostar. The detection of the H_2 jet thus provides evidence that ongoing accretion processes occur in the M17 disk. The team also estimates the mass outflow and mass accretion rates, which suggest that a star of high mass is forming within the M17 disk. This is an additional clue that high-mass stars form in a similar way to lower mass stars.

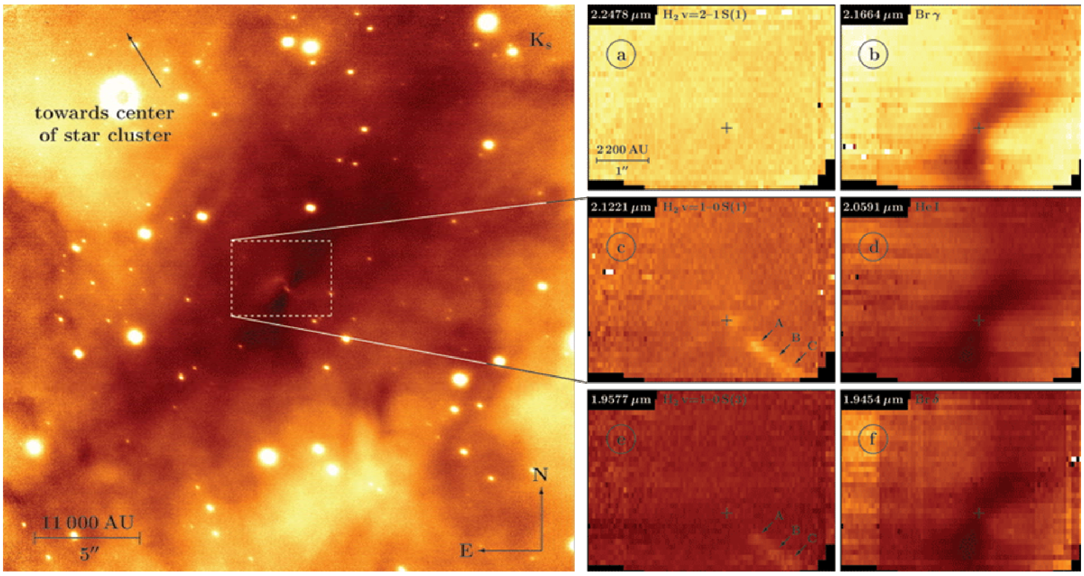

Figure 1. *Left: Near-infrared image of the M17 silhouette disk, discovered in 2004. The field of view is 27"x27", which roughly corresponds to 60000 AU x 60000 AU (AU stands for astronomical units). Right: Zoom on the central region at six selected wavelengths. The pictures were obtained with SINFONI. Each panel has a field of view of 4.8"x3.6" (i.e. 10560 AU x 7920 AU). While panels (b), (d), and (f) show the densest inner part of the silhouette disk, panels (c) and (e) reveal the H_2 jet (individual emission knots are labelled with A, B, and C).*

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[1] A high-mass star is a star of more than 8 times the solar mass.

[2] For information about this earlier discovery, see the ESO press release and the article published in *the ESO Messenger.*

[3] SINFONI (for "Spectrograph for INtegral Field Observation in the Near-Infrared") is one of the most recent instruments installed at the ESO-VLT. Associated to an adaptive optics module, it provides very high-angular resolution spectra and images. Technical details and first results can be found on the ESO web site.

[4] The team includes D.E.A. Nürnberger (ESO), R. Chini (Ruhr-Universität Bochum, Germany), F. Eisenhauer (MPE, Garching, Germany), M. Kissler-Patig, A. Modigliani, R. Siebenmorgen, M.F. Sterzik, T. Szeifert (ESO).

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