The circumstellar environment of EXLup and RCrA

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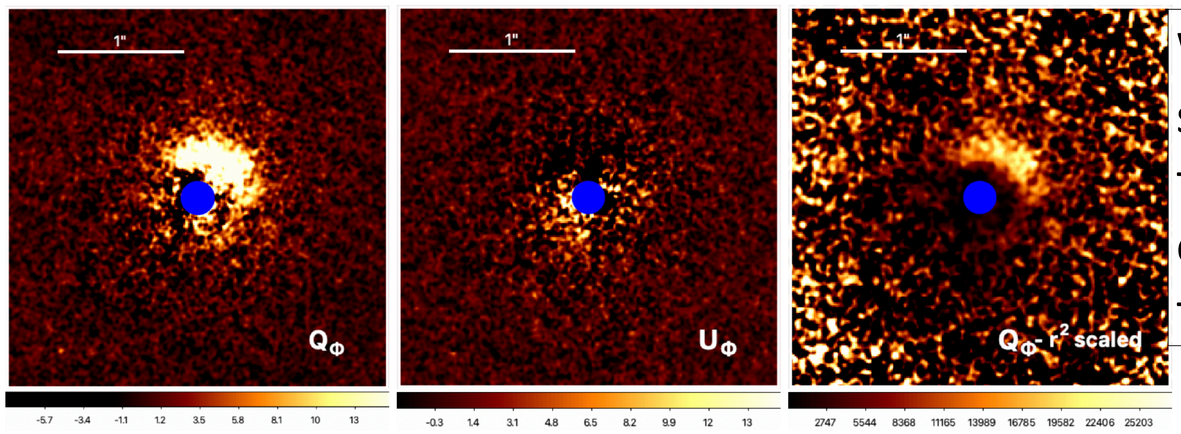
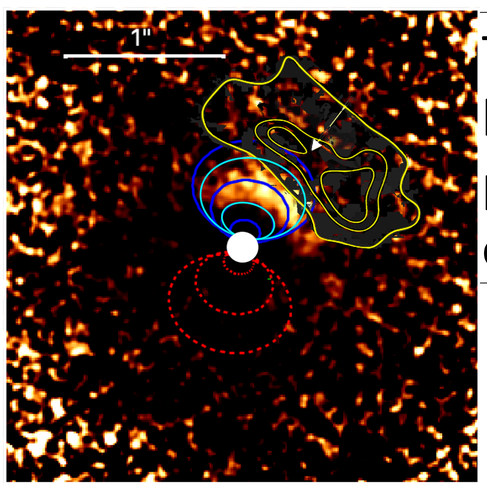
EXLup prototype of young eruptive EXOrs stars, characterized by repetitive outbursts due to enhanced accretion from the circumstellar disk onto the star



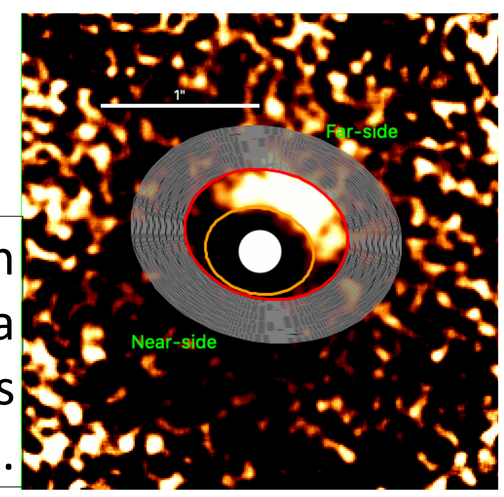
We observe the circumstellar environment in NIR scattered light acquired with SPHERE/IRDIS. We resolve for the first a compact feature around EX Lup azimuthally extending from 280deg to 360deg, and radially extending from 0.3" to 0.55" in the plane of the disk.

We explore two different scenarios for the detected emission:



The first one accounts for the emission as coming from the brightened walls of the cavity excavated by the outflow whose presence was suggested by ALMA observations in the J = 3--2 line of ^{12}CO.

The second one accounts for the emission as coming from an inclined disk. In this latter case we detect for the first time a more extended circumstellar disk in scattered light, which shows that a region between 10 and 30 au is depleted of m-size grains.



We favour the scenario in which the scattered light is coming from the circumstellar. We analyze the origin of the observed feature either as coming from a continuous circumstellar disk with a cavity, or from the illuminated wall of the outer disk or from a shadowed disk.

The origin of the µm-size grains depleted region might be the presence of a sub-stellar companion

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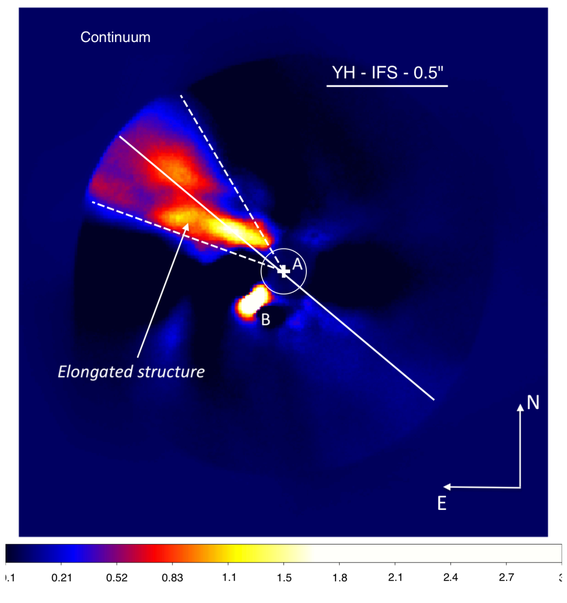
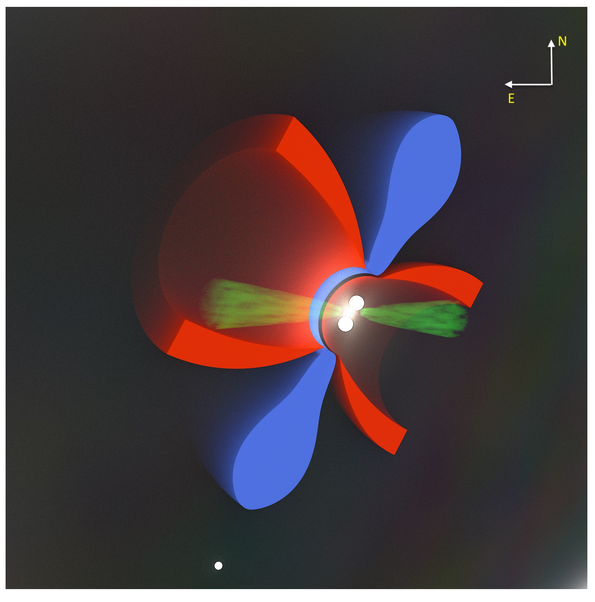
RCrA is a young and close-by Herbig Ae/Be triple system with an intermediate mass central binary whose separation is of the order of a few tens of the radii of the individual components, and an M-star companion at about 30 au.

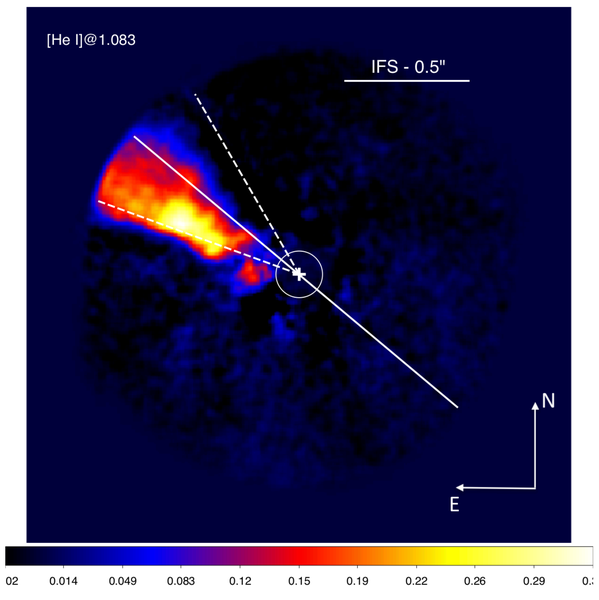
The observations reveal a complex extended structure that is composed of at least two components:



a non-uniform wide cavity whose walls are detected in continuum emission up to 400 au



a collimated wiggling-jet detected in the emission lines of Helium and Hydrogen.



The presence of [Fe II] emission projected close to the cavity walls suggests the presence of a slower moving wind, most likely a disk wind. The multiple components of the optical forbidden lines also indicate the presence of a high-velocity jet co-existing with a slow wind.

Circumstellar environments of young and close-by stars observed in scattered light reveal a wealth of information on their formation, evolution and possible not-yet observed companions