A SEARCH FOR NEW VERY LOW-MASS MEMBERS WITH DISKS IN THE CORONET CLUSTER

B. López Martí (1), M. Morales-Calderón (2), A. Bayo (3), B. Barrado (1,4), J. Eisloffel (5)

(1) Centro de Astrobiología (INTA-CSIC); (2) Spitzer Science Center; (3) ESO-Santiago; (4) Calar Alto Obs/ctory; (5) Thüringer Landessternwarte (TLS)

Abstract

We report on the results of an infrared study of the Coronet cluster in the core of the Corona Australis star forming region. Spitzer IRAC and MIPS 24 μm data are combined with 2MASS near-infrared photometry to identify new candidate members of the cluster using different colour criteria documented in the literature. For these, optical photometry is available, enabling us to derive their effective temperatures and gravities from the fitting of their SEDs. According to our results, if they indeed belonged to the Coronet cluster, these three objects would be substellar, thus being among the lowest mass objects with disks identified so far in this region (M<0.030 M☉). One of these sources could be the lowest-mass object identified so far to possess a disk with an inner hole.

Object selection

To look for new candidate members of the Coronet cluster harbouring disks, we made use of the IRAC (1.2-4.5 μm) and 24 μm photometry of a new sample of sources which are likely contaminants identified from the literature. For these, optical photometry is available, enabling us to derive their effective temperatures and gravities from the fitting of their SEDs. According to our results, if they indeed belonged to the Coronet cluster, these three objects would be substellar, thus being among the lowest mass objects with disks identified so far in this region (M<0.030 M☉). One of these sources could be the lowest-mass object identified so far to possess a disk with an inner hole.

Spectral energy distributions (SEDs)

According to the SED fitting results, IRAC-CrA 1 and 2 would be two relatively cool disks with Teff=2500 K, while IRAC-CrA 3 would be a very young, brown dwarf with Teff=4500 K. According to the reported disk fraction, both IRAC-CrA 1 and 2 would be the lowest-mass objects known to harbour disks.

Disk fraction

The very low number of new candidate members identified in this work suggests that the number of substellar coronet members harbouring primordial disks is basically complete down to 0.030 M☉. Thus, the results from this study do not substantially alter the reported disk fraction in this cluster, which is found to be around 45-50% (Sicilia-Agullar et al. 2008; López Martí et al. 2010).

References


Hertzprung-Russell Diagram

We made use of VOSA to derive effective temperatures and luminosities for all the Coronet members and candidate members with optical counterparts selected with our method, and to plot them in the HR diagram. The locations of our new candidate members in this diagram are fully compatible with those of the previous members.

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5