Spectral classification of candidate OB stars with disks in Cygnus OB2

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Massive OB stars are important astrophysical objects: during their rapid evolution (compared to that of low-mass stars) they have a strong impact in the surrounding region due to their intense ionizing flux and strong stellar wind. In particular, in several young massive clusters we observe the dramatic effects of their ionizing radiation on the early evolution of surrounding low mass stars and their circumstellar disks (and their planets), such as the photoevaporating protoplanetary disks in the Trapezium in Orion (O'dell et al. 1993). The gas in these disks is heated up to some thousands degrees by the UV radiation emitted by the O stars in the center of the cluster, and it flows away from the disks in a pressure-driven wind. Because of this process, gas in circumstellar disks closer than $1\,pc$ from the ionizing sources can be totally removed down to about $10\,AU$ from the central star in less than $1\,Myr$, one order of magnitude faster than in normal evolution time-scale (Hollenbach 1994). Taking into account these destructive effect of UV radiation from massive stars on circumstellar disks and their short PMS phase, it is not surprising that OB stars in young clusters are practically never observed with disks (disks in O-earlyB stars are supposed to be destroyed in about $0.2 - 0.7\,Myrs$, Hollenbach et al. 2000).

The best target to study OB stars in a young cluster in the massive Cygnus OB2 association. It is in fact the closest OB association to the Sun ($1450\,pc$, Hanson 2003) and it contains hundreds of OB stars (Knödlseder 2000) together with a significant population of low-mass members (Albacete Colombo et al. 2007). Recently, Cyg OB2 has been surveyed with Chandra (the $1.08\,Msec$ Chandra Cygnus OB2 Legacy Survey, P.I. Jeremy Drake) and GTC/OSIRIS in $r'\,i'\,z'$ bands (P.I. García-Alvarez) with the aim, together with existing infrared data, of studying the early stellar evolution and the star formation process in presence of such a large OB population.

A preliminary selection of disk-bearing objects has been performed by combining the optical and infrared data, selecting about 2000 candidate disk-bearing cluster members in an area of about 1 square degree centered on Cyg OB2. Among these objects, 17 candidate OB stars show infrared excesses typical of the presence of a circumstellar disk. If confirmed, this is an important result, indicating that: 1) these stars are a newly born population of massive stars in Cyg OB2, where eventually massive stars formation is still propagating in the cloud triggered by the radiation of the OB stars in the cluster core, or 2) it is possible that OB stars can host disks more massive than low-mass stars, which can survive longer to their ionizing radiation. Unfortunately, present spectral classification is mostly based on infrared spectra, and it suffers large uncertainty

(Comeron et al. 2002). In order to achieve an accurate spectral classification of these 17 candidate OB stars with disk, given also the large visual extinction in the direction of the cluster, we plan to take advantage of the large sensibility of GTC/OSIRIS.