Observational aspects of Herbig Ae/Be stars and of candidate young A/B stars

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PART C

Herbig Ae/Be candidates in the very young open cluster NGC 6611 (M 16)

In Parts A and B we have encountered various difficulties to make a clear and easy distinction between pre-main sequence stars and more evolved objects. The difficulties are due to differences in age and uncertain distances causing the heterogeneity of the samples. This makes it rather difficult to use detected characteristics to conclude about their evolutionary stage.

In the case of young open clusters above mentioned problems are less severe. One can assume that stars being member of open clusters are born about the same time, and that they are located at the same distance. For this reason the well known very young open cluster NGC 6611 was studied for the detection of early type (A and B) pre-main sequence members.

The results of such an investigation are reported in two parts:
in Chapter C1: entitled “The extinction, the distance and the HR diagram of the extremely young open cluster NGC 6611”, the stars in the cluster field are studied, from which a Hertzsprung-Russell diagram can be constructed, which will give information about some cluster properties such as distance and age;
in Chapter C2: entitled “Pre-main sequence candidates in the very young open cluster NGC 6611”, we use the findings in Chapter C1 to study in detail possible cluster members, which were previously recognised as pre-main sequence candidates, in order to discover true Herbig Ae/Be objects.

Especially in the sample of early B type stars it is difficult to distinguish the Herbig objects from evolved post-main sequence counterparts. The reason is that because of their short evolutionary time, the time-interval in which they can be detected to be in their pre-main sequence phase is small. In the case of stars close to the main sequence it is also important to know whether they are “still being young pre-zero-age main sequence”, or “being just evolved post-zero-age main sequence” objects. If it is, by any means, possible to separate both type of objects, it will not be difficult to point out, which objects are still surrounded by plenty of gas and dust. By studying these young objects further, we are most probably able to follow the formation of planetary bodies in the circumstellar environment.