

Star Clusters - Syllabus

- Definition and Characteristics of Star Clusters
 1. Open Clusters
 2. Globular Clusters
 3. Stellar Associations
 4. Moving Groups
 5. Massive Star Clusters
- Formation and Evolution
- Observational and “theoretical” techniques:
 1. Membership determination
 2. Isochrone fitting
 3. Pitfalls of reduction techniques

- (Different) Main Sequence(s)
- Star Clusters in the Gaia era
- Extragalactic Star Clusters
- N-body simulations
- Databases and surveys (WEBDA, Gaia, GAIA-ESO survey, ...)
- All slides as .pdf files on Server for download

Star Clusters - Exercises

- Isochrone fitting - WEBDA
- Membership probability estimation – CLUSTERIX and UPMASK
- Automated Stellar Cluster Analysis (ASteCA)
- Writing a paper – variable stars as members of open clusters

Paper – Variable stars

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**Astronomy
&
Astrophysics**

Catalogue of variable stars in open cluster fields[★]

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ABSTRACT

Context. We present the first catalogue of known variable stars in open cluster regions and with up to two times the given cluster radius. This gives basic information about the distribution of variable stars in cluster fields for the complete sky.

Aims. Knowledge of the variable star contents in open clusters is a significant advantage in their study. Analysing variability of cluster members and fields stars also allows us to study the characteristics of stars and clusters together. This catalogue of variable stars in open cluster fields is the first step in supporting such studies.

Methods. We took all variable and suspected variable stars into account from the most complete collection, “The AAVSO Variable Star Index”, and did a cross-match of these stars with the most complete catalogue of galactic open clusters named DAML02.

Results. Our on-line catalogue presently contains 18 065 variable stars. We present the basic statistical distribution according to types of variability.

Key words. open clusters and associations: general – catalogs – stars: variables: general – proper motions

Paper – Variable stars

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White dwarf-open cluster associations based on *Gaia* DR2

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ABSTRACT

Context. Fundamental parameters and physical processes leading to the formation of white dwarfs (WDs) may be constrained and refined by discovering WDs in open clusters (OCs). Cluster membership can be utilized to establish the precise distances, luminosities, ages, and progenitor masses of such WDs.

Aims. We compile a list of probable WDs that are OC members in order to facilitate WD studies that are impractical or difficult to conduct for Galactic field WDs.

Methods. We use recent catalogs of WDs and OCs that are based on the second data release of the *Gaia* satellite mission (GDR2) to identify WDs that are OC members. This crossmatch is facilitated by the astrometric and photometric data contained in GDR2 and the derived catalogs. Assuming that most of the WD members are of the DA type, we estimate the WD masses, cooling ages, and progenitor masses.

Results. We have detected several new likely WD members and reassessed the membership of the literature WDs that had been previously associated with the studied OCs. Several of the recovered WDs fall into the recently reported discontinuity in the initial-final mass relation (IFMR) around $M_i \sim 2.0 M_\odot$, which allows for tighter constraints on the IFMR in this regime.

Key words. open clusters and associations: general – white dwarfs – catalogs – surveys