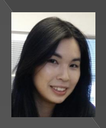


Identifying the ejected population from disintegrating multiple systems

A. K. P. Yip[1], D. Pinfield[2], R. Kurtev[1], M. Gromadzki[1], F. Marocco[2]

[1] Instituto de Física y Astronomía, Universidad de Valparaíso, Av. Gran Bretaña 1111, Playa Ancha, Casilla 5030, Valparaíso, Chile.
[2] Centre for Astrophysics Research, Science and Technology Research Institute, University of Hertfordshire, Hatfield AL10 9AB, UK.

alexandra.yip@postgrado.uv.cl

Introduction

Kinematic studies of the Hipparcos population have revealed associations that are best explained as disintegrating multiple systems, presumably resulting from a dynamical encounter between single/multiple systems in the field (Li et al. 2009).

In this project we explore the possibility that known ultra cool dwarfs may be components of disintegrating multiple systems, and consider the implications for the properties of these objects.

Aim

➢A method to find evidences of disintegrating candidate associations with cool nearby components combining various large area surveys;

➢Look for and identify additional fainter objects using new surveys such as UKIDSS, SDSS, VISTA and WISE;

➢Compile a disintegrating candidate associations catalog with all currently available information;

➢In depth characterization of the most promising candidate associations with kinematic analysis;

➢Test the formation and evolution models for multiple systems.

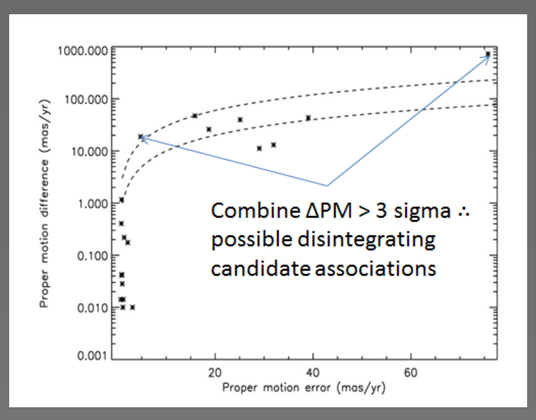
Progress so far

The primary catalogs we are using are Dwarf Archive (hereafter DA), Hipparcos Main Catalog (hereafter HMC) and Gliese-Jahrei Catalog (hereafter GJC).

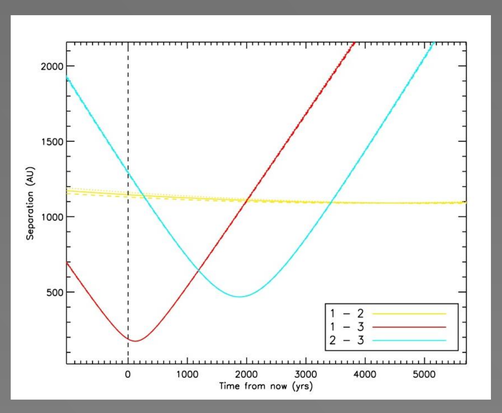
First we looked for groups of objects with common distance, applying a conservative separation constraint of 50 kAU or 10 arcminutes to maximize the number of candidates.

Then we identified non-common proper motion (hereafter non-CPM) associations by requiring that the PM of at least one component diverges by more than 3 sigma from the others. An example can be seen in the figure on the RHS, where we mark the two non-CPM systems.

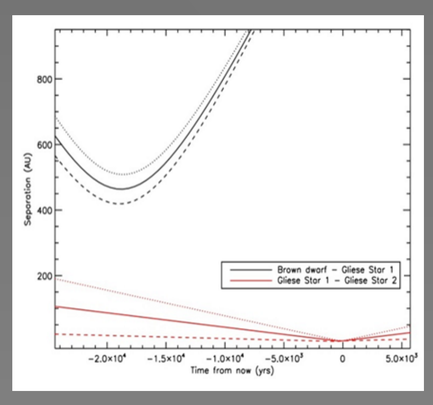
The following step was to calculate the separation between the components of each association as a function of time to identify those that were currently moving away from each other. Examples can be seen in the figures below. Associations that we will discard are on the LHS, associations that we will keep are on the RHS.



Each asterisk represents an association. The two dashed-lines are the 1 sigma and 3 sigma limit.

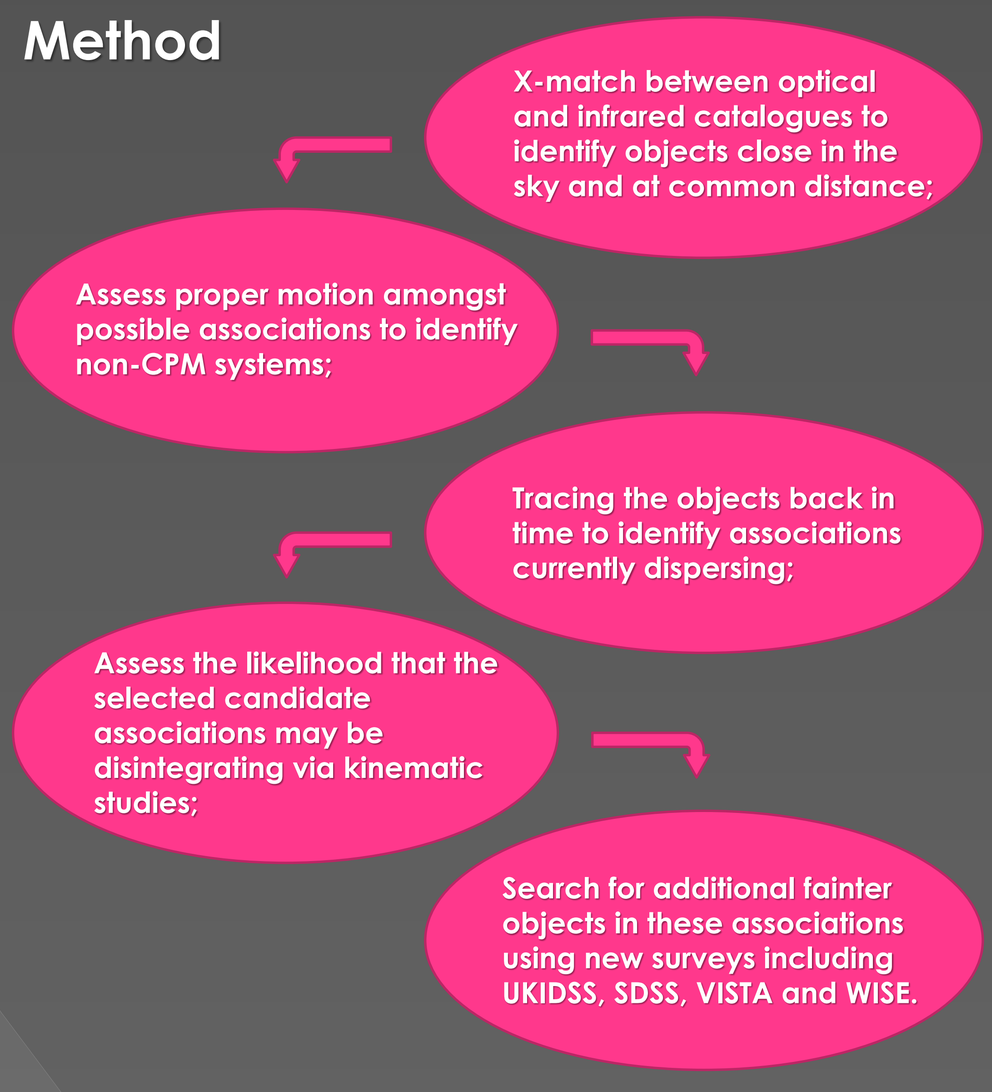


The parabolas show the separation between the components of the association. The minimum is in the future so the components are moving towards each other.



The minimum separation between the components in the association are in the past, so the association is disintegrating. The dotted-lines and the dashed-lines are the uncertainty on the separation.

Method



Future works

➢**Assess the likelihood that the selected candidate associations may be disintegrating via kinematic studies;**

➢**Expand the list of candidate associations and search for additional fainter objects using surveys such as UKIDSS, SDSS, VISTA, WISE and of course *Gaia*;**

➢**Perform dynamical simulations to test the disintegration scenario;**

➢**Compare my finding with formation and evolution models for sub-stellar objects and multiple systems.**

Acknowledgments: This work used data from the Dwarf Archive, Hipparcos and Gliese Catalogues. A.Y. would like to thank the Cool Stars 19 organising committee and Proyecto CONICYT-REDES140024, "SOCHIAS grant through ALMA/Conicyt Project #31150039" and Ministry of Economy, Development, and Tourism's Millennium Science Initiative through grant IC120009, awarded to The Millennium Institute of Astro- physics, MAS for financial support.

References

Li, P. J., Fu, Y. N., Sun, Y. S., 2009 A&A 504, 277-289

"The Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun",
Uppsala, Sweden, 5th – 10th June, 2016