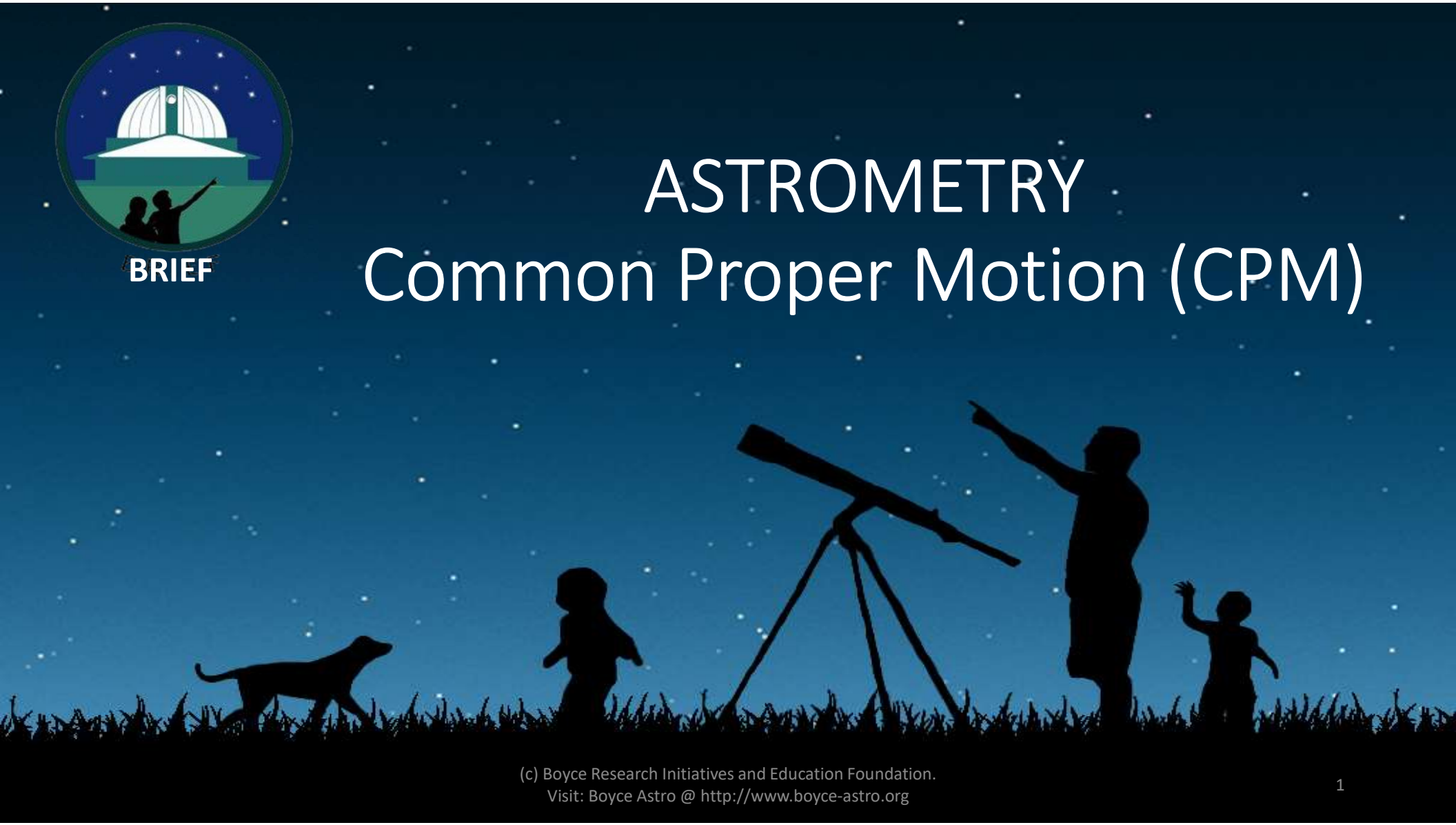
BRIEF

ASTROMETRY
Common Proper Motion (CPM)



Overview

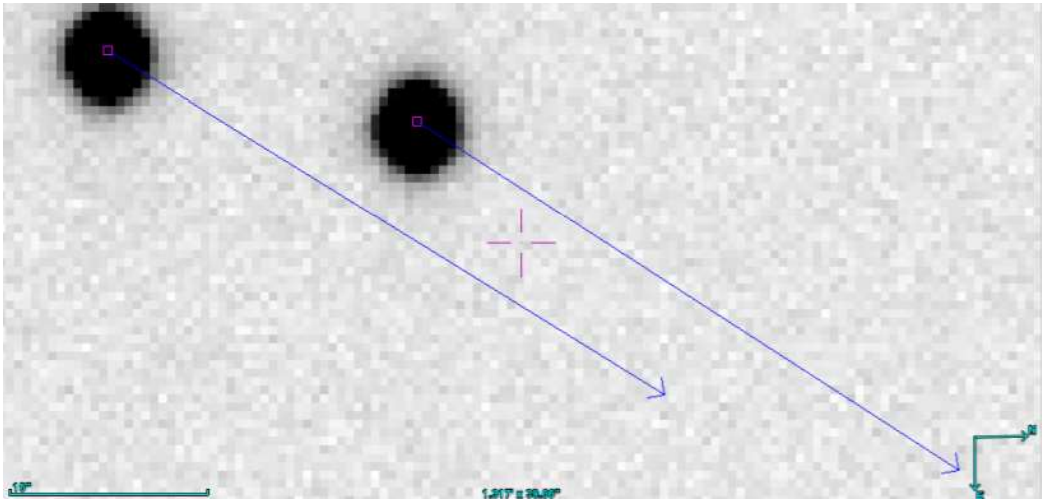
Not all double stars are binary.

As we know, some can be an optical double stars, and then there are others that are close to each other and share very similar motions.

These are known as Common Proper Motion stars. Many binary stars are CPM stars.

The commonality of motion in these stars are thought to be a by-product of their stellar birthplace energy displayed as they travel through space together.

This lesson will assume a familiarity with proper motions.



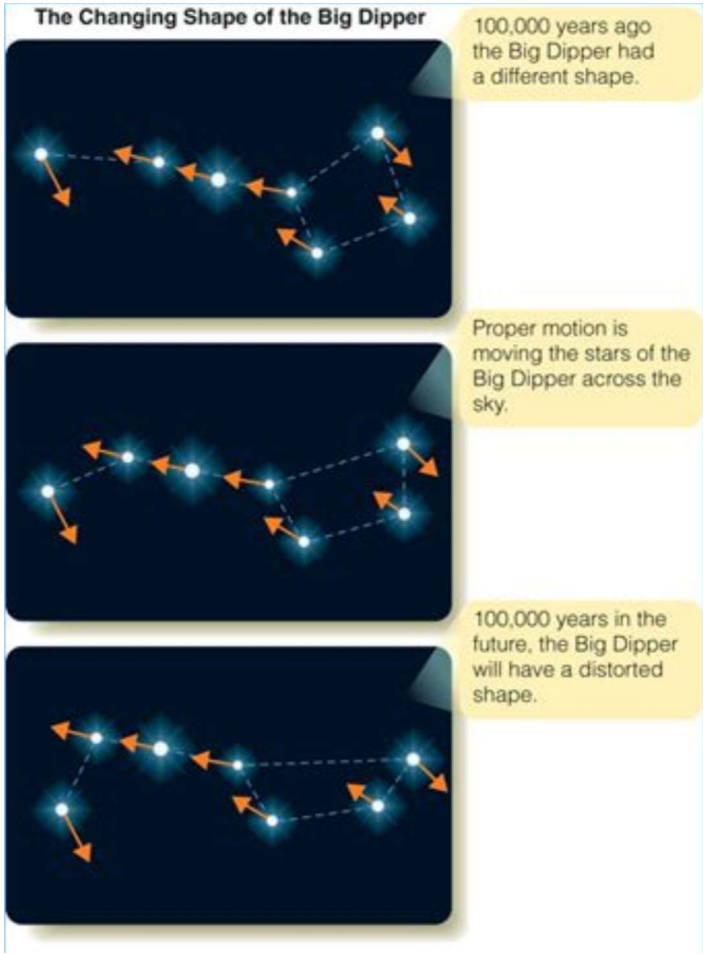
Common Proper Motion

Common proper-motion pairs are a subset of binaries where the stars share very similar proper motions.

Their physical separations are such that there is little if any relative motion between the pair as measured over time-scales of a century or more.

Also the separations are often sufficiently large for it to be uncertain as to whether it is possible for the objects actually to be in orbit about each other.

Most true binaries, including close pairs, will share a common proper motion. These stars that cannot necessarily be shown to be orbiting binaries, but they have a coincidence of space motion with respect to other nearby field stars that strongly suggests they are related to each other.



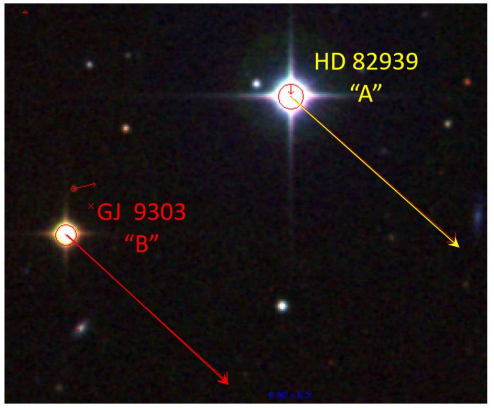
Common Proper Motion (CPM)

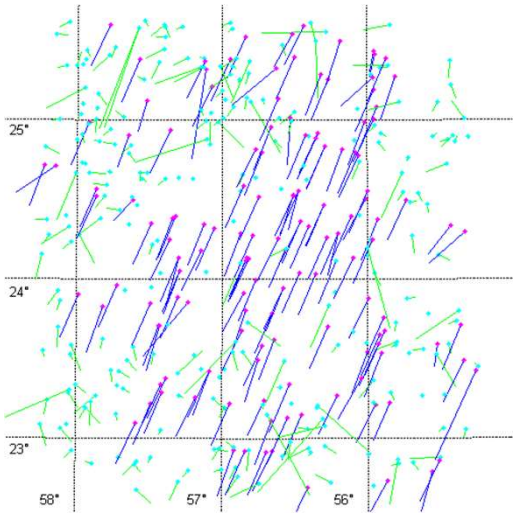
Although not all of these CPM stars are orbiting binaries, their similar motion is a clue that points out these pairs as possible candidates to true binaries.

Because of their small binding energies, CPMs are good sensors to detect unknown mass concentrations that they may encounter along their galactic trajectories.

As such, these are objects of considerable theoretical and observational interest and relevant to the understanding of the processes of formation and dynamical evolution of the Galaxy.

CPMs, if very distant, may not exhibit any significant motion, linear or otherwise, over a human lifetime or centuries or even millennia.

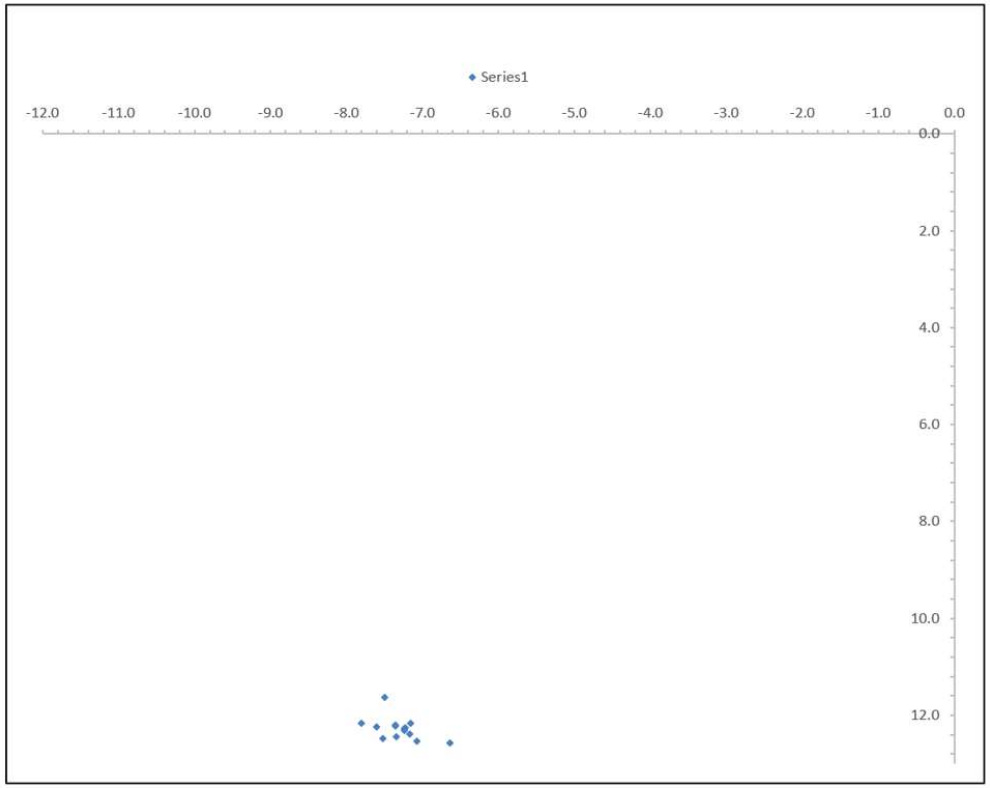




Summary

From these descriptions of CPM pairs, when plotting historical measurement data of Theta and Rho, an indication of a possible CPM pair is the central component at the origin of a graph (0,0), and the secondary at a fixed distance with a “shotgun” pattern of measurements.

To further verify common proper motion, ALADIN and GAIA should be consulted to review the motions for each component.



Questions?