Photometrics and Kinematics of Young Moving Associations

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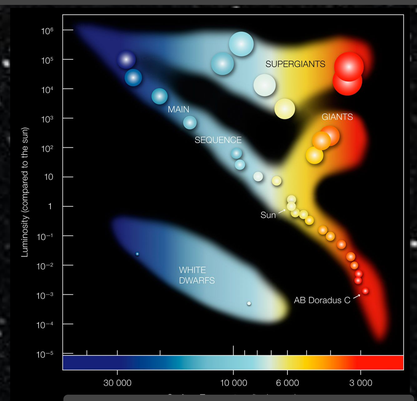
Background and Introduction Title

- We looked at photometrics and kinematics of 27 young moving groups of stars observed by Gaia that lie within 100 parsecs from us.
- We wanted to understand how young groups of stars move through the galaxy, and what properties they share with other stars in their group.

-A part of understanding the evolution of our galaxy is understanding the evolution of its component stars. To learn more about the evolution of stars, we are organizing into moving groups that share stellar nurseries, with that future astronomers can observe the patterns in their photometrics and kinematics to learn more about the structure of the Milky Way.

HR Diagram

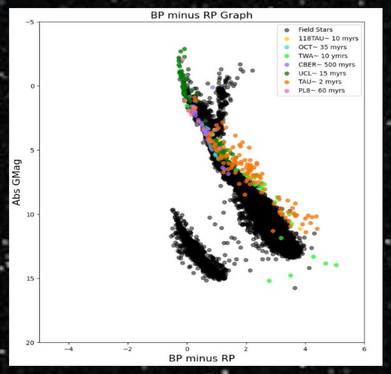
-Here is a sample image of a Hertzsprung-Russell Diagram, this diagram plots the temperature of a star against its luminosity, which also offers a reliable prediction of color, mass, and size of stars.



Hertzsprung-Russell Diagram | ESO

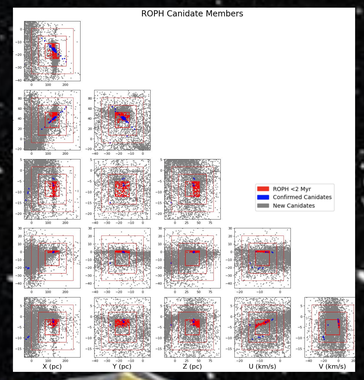
HR Diagrams

- We used data from DR2 in TOPCAT, which is a graphing software, and crossmatched in 2 radius (arcsec) to find new stars from DR3.
- We used Python
  - To plot HR Diagrams with Gaia Field Stars



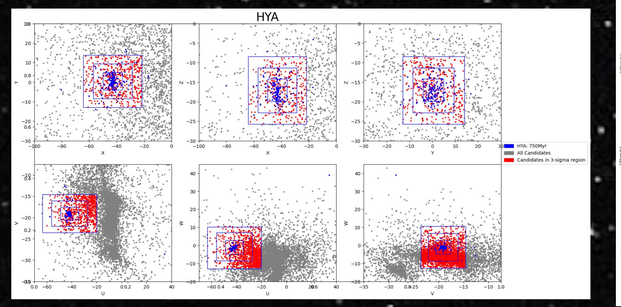
Kinematics Diagrams

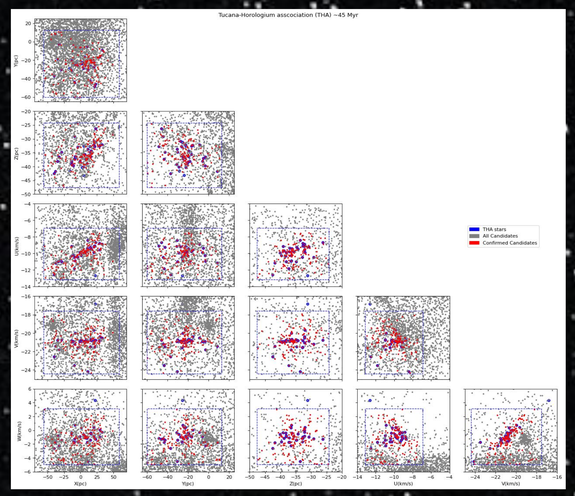
- Using the table of stars crossmatched with DR3 in TOPCAT, we made plots of all the XYZUVW vectors against one another.
  - We graphed 3 rectangles on each box that represent a standard deviation of distance from the mean position/velocity of each group.
  - Any stars that fell within 1σ region of the mean in all 6 dimensions are likely a member of the young moving group. We plotted candidates that fit within 3σ regions.

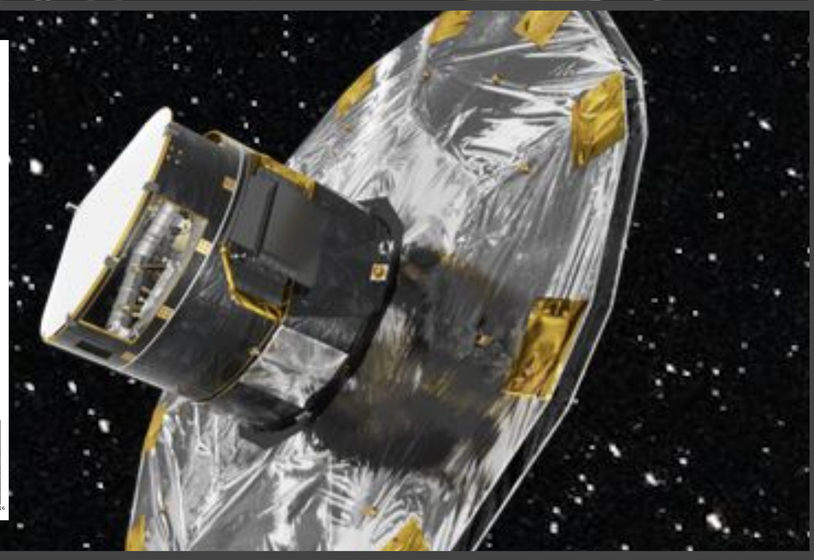


Results Section Title

- When plotting more than 14000 unidentified objects (Candidates) with Young members, we found some objects that were overlapped and are likely to be a part of the former groups.
- 2 of the 27 groups- HYA and THA shows the σ regions where the blue dots are the Young members and the red dots represent the candidate stars that lie within the 3σ regions.







Discussions and Conclusions Section Title

- Our organized data makes apparent the connection between confirmed member stars of nearby young moving groups, and unconfirmed candidate stars that might belong to a known group.
- Having a more complete image of the young moving groups in the solar neighborhood can help understand how and where moving groups have formed, and which stellar nurseries they belong to.