

# MW-GAIA: BRINGING THE MILKY WAY TO SCHOOLS 2021

JUNE  
2-4  
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## TOPICS COVERED

- The Milky Way as a Galaxy: the science and research background
- Dissemination of the GAIA science
- Bringing the research closer to the public
- Teaching the Milky Way in schools
- How to make teaching and science communication more inclusive

Deadline for abstract submission: 14 May 2021

Deadline for registrations: 1 June 2021



## Poster 8



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### Bringing open clusters to the high-school

Open clusters allow us to imagine the very different sky humanity would see if the Sun was (still?) located in one. The Gaia data easily let non-astronomers select members of nearby open clusters, which may be familiar to high-school students, like the Pleiades, and connect with astronomy history and mythology. The Gaia colour-magnitude diagram permits the educator to introduce important notions like the main sequence, and stellar evolution.

In this (yet-to-be-tested) workshop, we propose high-school students to go and search for cluster members in Gaia data using Topcat and the VO; use Topcat to visualize the stars and their motion in 3D; and finally use Gaia Sky to roam the cluster.

### Abstract

Open clusters are complex structures yet they appeal to our imagination. One can picture oneself on a planet surrounded by hundreds of stars as bright as Vage. Their clean colour-magnitude diagrams allow to explain stellar properties as a function of mass, and to discuss stellar birth.



The Pleiades stellar cluster in a recent APOD, with Mars. What if our Sun had been located at the centre of the Pleiades? @Kristine Richer

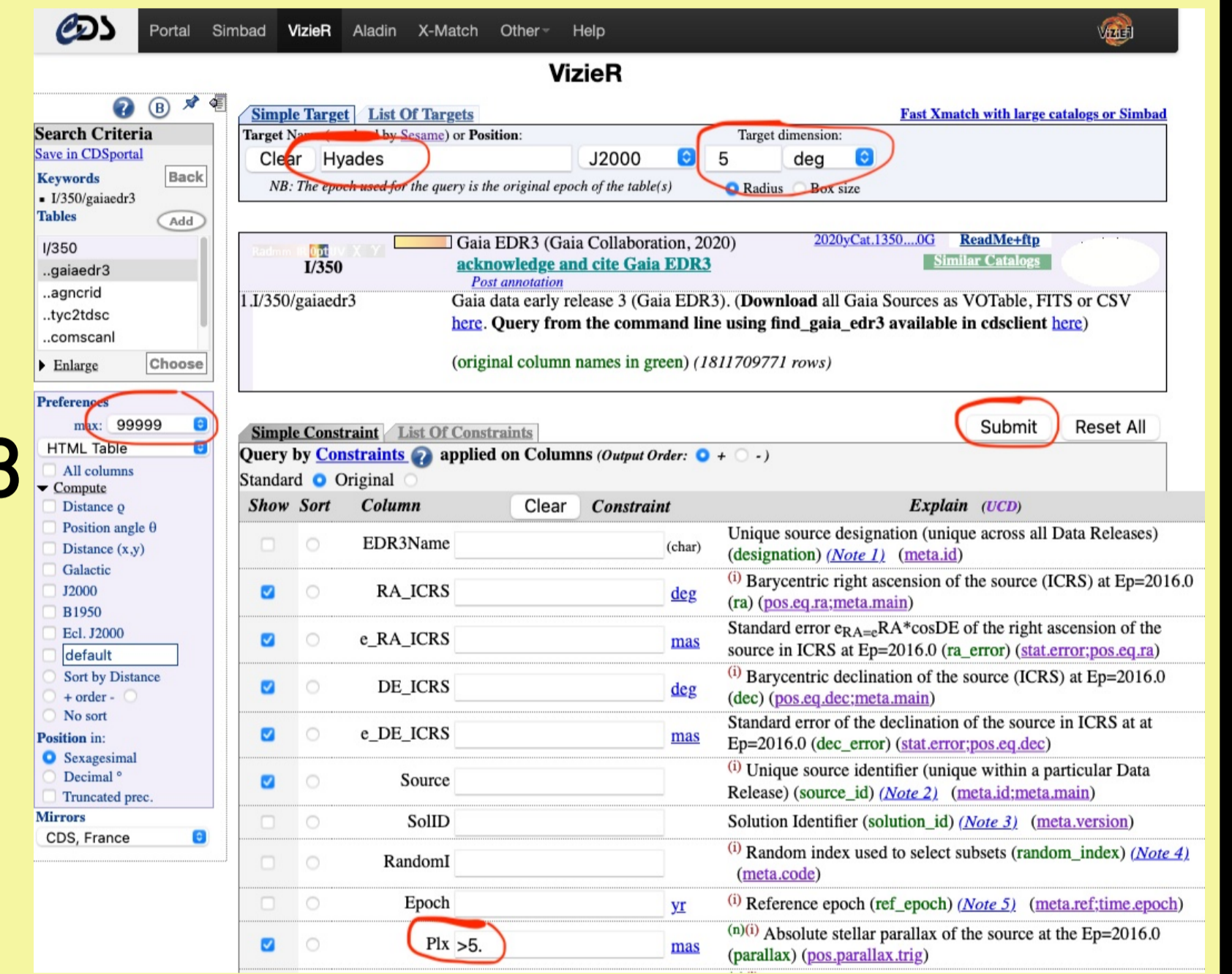
Gaia data quality lets high-school students identify cluster members cleanly, and software like Topcat let them manipulate and represent the data in no time. In this (yet to be tried) workshop, students will download Gaia data, run Topcat to select cluster members and visualize position and 3D motions. Finally the teacher shows a flyby using Gaia Sky.

### Organisation of the workshop

- 15min: introduction: history of observations since Antiquity: mythology (e.g. Pleiades); Messier catalogue; brief characterisation of an open cluster: compact and co-moving with stars of various masses.
- 15min: demonstration of Topcat's relevant functionalities: sky plot, 2D and 3D scatter plots. Screen shots have been provided to the students. Download is done through the CDS Vizier service.
- 30min: the students download the data around a cluster centre, use sky plot, 2D proper motion graph and parallax histogram to select members. Each group gets its cluster, for later comparison.
- 10min: the students discuss their results with the class
- 30min: 3D visualisation of the cluster, CMD, proper motion arrows on sky plot
- 15min: the teacher blinks 2-3 CMDs produced by the students of clusters of various ages and illustrates stellar evolution vs. colour. He picks up a cluster and runs a flyby using GaiaSky.

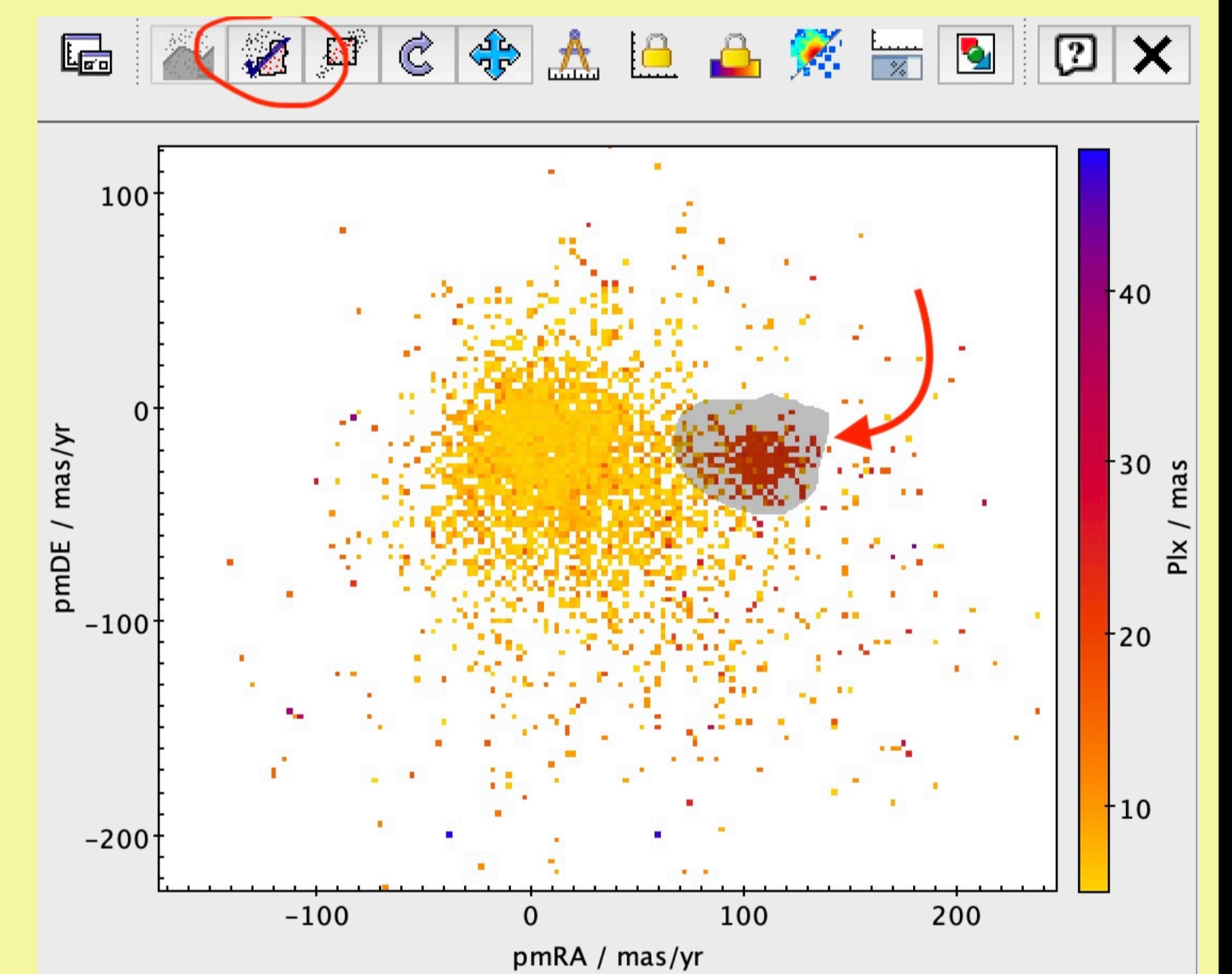
### Step 2: demonstration of Topcat's functionalities and data download.

The latter is easiest using Vizier of CDS, but more advanced students can use Topcat TAP ADQL queries. Right: the Vizier form for EDR3 and how to fill it. The data are sent to Topcat through the SAMP protocole or saved on disk to be loaded by Topcat.



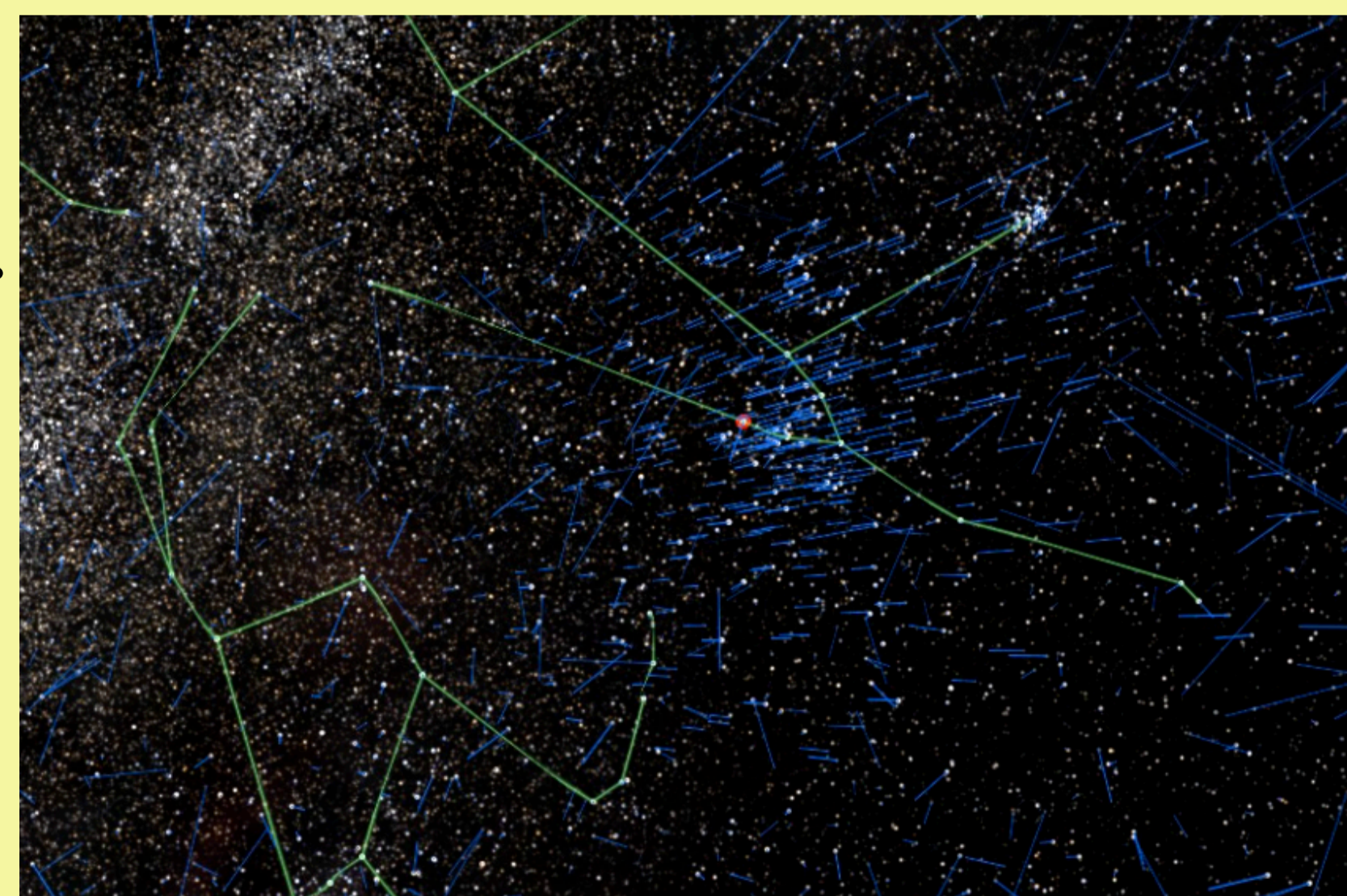
### Step 3: the students display the data and select cluster members [or candidates].

Right: proper-motion graph around the Hyades cluster. The students identify and select the distinctive group of stars, colour-coded here by median parallax.



Step 6: the teacher (or the students if time allows) runs Gaia Sky to fly through the cluster. This is the opportunity to discuss astronomical distances, individual motions of stars within the cluster (accelerating the time), and to have some fun!

Gaia Sky allows to record a movie for convenience, and to load the students' members list.



The Hyades, as seen in Gaia Sky from the Sun, with constellations (green) and proper motion (blue). ©Stefan Jordan



The Hyades stellar cluster. ©Jose Mtanous

### References and acknowledgements

This workshop is a reduced version of an online workshop for university students created with support by ESA (grant PR984 Space Studies). Special thanks to Mark Taylor for creating and improving a wonderful software and supporting so diligently.

- Topcat: Mark Taylor, 2017: [arXiv:1707.02160](https://arxiv.org/abs/1707.02160), download [here](#).
- Gaia Sky: developed by Stefan Jordan, Antoni Sagristà, et al., see [documentation](#) at ARI
- Gaia EDR3: Gaia Collaboration, *A&A* 649, A1 (2021)

### Requirements

Students (in groups of 1 to 3) need a computer with Topcat installed. The students should know about angular velocity, angular units, astronomical distances, stellar types.