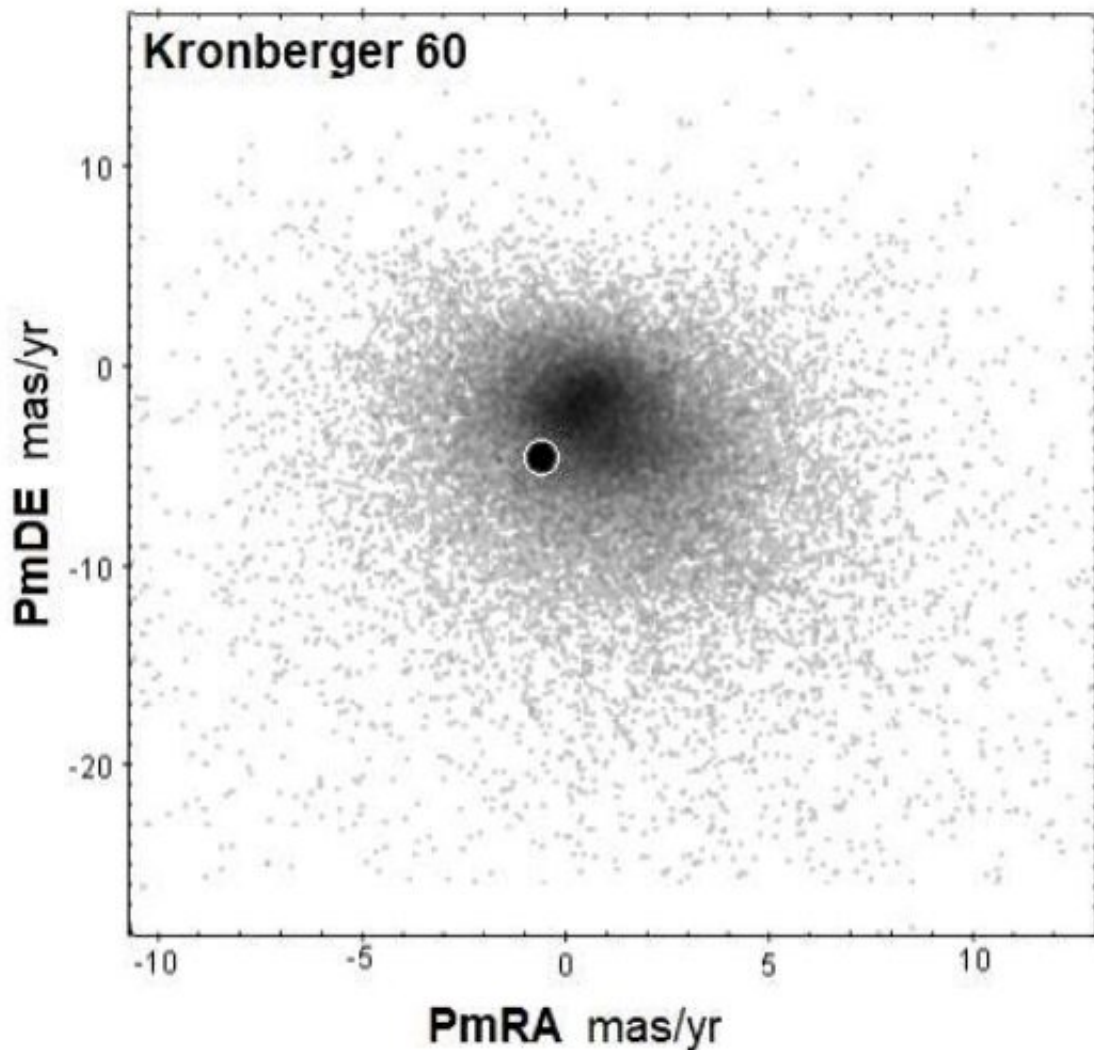


Researchers investigate properties of the open cluster Kronberger 60

September 9 2020, by Tomasz Nowakowski



The vector point diagram VPD of Kronberger 60, from which the highest concentrated area was selected for the study. Credit: Tadross et al., 2020.

Using data from ESA's Gaia satellite, astronomers from the National Research Institute of Astronomy and Geophysics in Cairo, Egypt, have explored the open star cluster Kronberger 60. Results of the study, published September 2 on the arXiv pre-print server, provide more insights into the properties of this cluster.

Open clusters (OCs), formed from the same giant molecular cloud, are groups of [stars](#) loosely gravitationally bound to each other. So far, more than 1,000 of them have been discovered in the Milky Way, and scientists are still looking for more, hoping to find a variety of these stellar groupings. Studying OCs in detail could be crucial for improving our understanding of the formation and evolution of our galaxy.

Kronberger 60 is a poorly studied, irregularly shaped OC in the constellation Auriga, located some 6,400 light years from the Earth and about 34,200 light years from the galactic center. The cluster is estimated to be 794 million years old, its diameter is calculated to be 1.6 arcminutes, and its reddening is at a level of approximately 0.84 mag.

In order to get more information about the parameters of Kronberger 60, astronomers led by Ashraf Latif Tadross have analyzed the data available in Gaia Data Release 2 (DR2). The DR2 dataset, released April 25, 2018, provides high-precision measurements, including positions in the sky, parallaxes and proper motions for more than 1 billion sources in our galaxy.

"The most important aspect of using the Gaia DR2 survey lies in the positions, parallax and proper motions for the cluster stars with the homogeneous photometry, which makes the membership candidates precisely determined. On this respect, several astro-photometric parameters of the open star cluster Kronberger 60 have been estimated," the researchers explained.

The study found that Kronberger 60 is larger than previously thought. Its limited radius is about 10 arcminutes, core radius is estimated to be 0.38 arcminutes, while the cluster's tidal radius was calculated to be approximately 27.4 light years.

According to the paper, Kronberger 60 consists of around 180 member stars and its total mass is some 190 solar masses. The total luminosity of the cluster is -3.0 and its reddening is 0.23 mag. Based on the DR2 data, the astronomers estimated that Kronberger 60 is 800 million years old and is located at a distance of about 6,300 [light years](#).

Moreover, the relaxation time of Kronberger 60 was calculated to be 34 million years. It is the period during which a [cluster](#) loses all traces of its initial conditions. Therefore, this value is about 23.5 times smaller than the estimated age of Kronberger 60, what, according to the study, suggests that this OC is dynamically relaxed.

"Our study is showing a dynamical relaxation behavior of Kronberger 60," the researchers concluded.

More information: Characteristics of the open star cluster Kronberger 60 using Gaia DR2, arXiv:2009.00263 [astro-ph.GA]
arxiv.org/abs/2009.00263

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Citation: Researchers investigate properties of the open cluster Kronberger 60 (2020, September 9) retrieved 25 April 2024 from
<https://phys.org/news/2020-09-properties-cluster-kronberger.html>

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