

# Exploring the true face of a unique globular cluster in Sagittarius

July 6 2022, by Li Yuan

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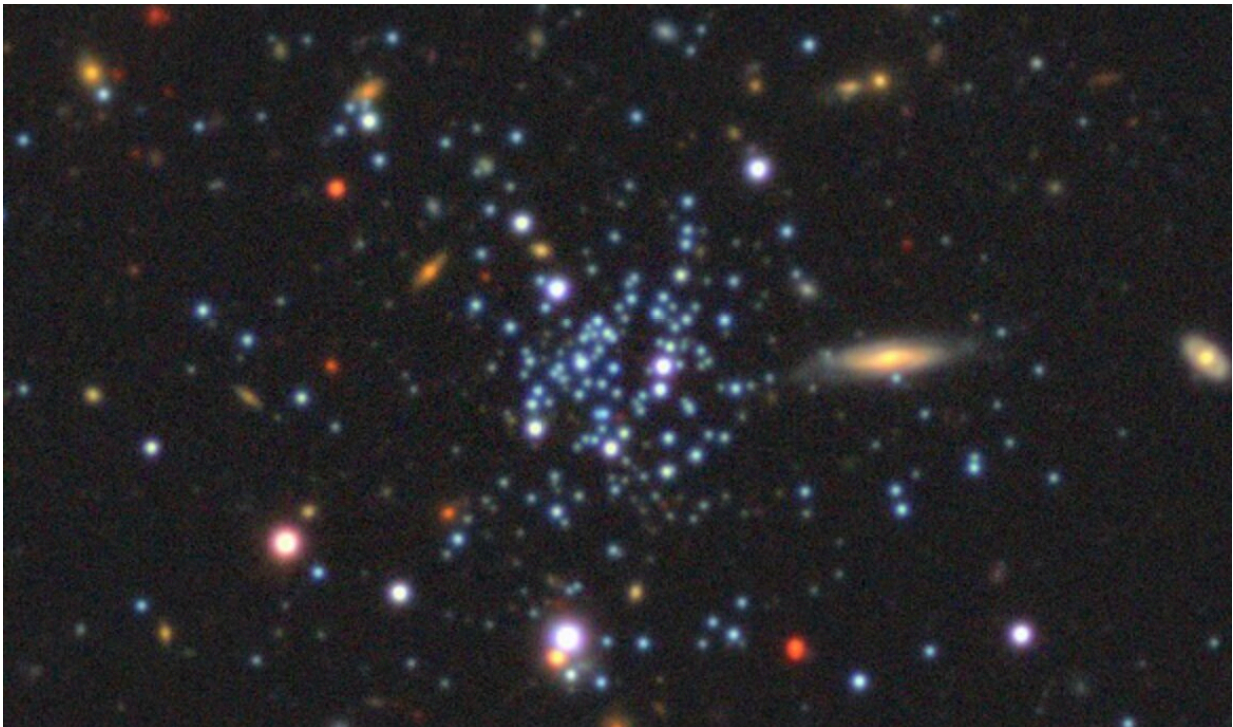


Fig. 1 Image of Whiting 1. Credit: DESI Legacy Imaging Survey

A recent picture by the DESI Legacy Imaging Survey features a mysterious globular cluster Whiting 1 in the galactic halo. So, what is Whiting 1 and why do we care about it?

Whiting 1 is a faint and young globular cluster embedded in the

Sagittarius stream. It was initially reported as an in-situ formed globular cluster in the galactic halo, however, its young age and moderately rich metallicity do not conform to our current understanding of typical galactic [globular clusters](#).

A comparable age-metallicity relation as well as kinematics to that of the Sagittarius stream makes Whiting 1 a member of a rare class of objects. Astronomers are more inclined to believe Whiting 1 is a child of the Sagittarius dwarf galaxy.

Over the past few years, the fact that the Sagittarius dwarf galaxy can host globular clusters and contribute to the building up of the galactic halo has come to be believed. Regarding Whiting 1, it could be a cluster born in the Sagittarius dwarf galaxy that immigrated to our Galaxy along the Sagittarius stream by the galactic accretion. This is a good story about its origin, but the speculation needs to be confirmed.

The best way to explore the origin of Whiting 1 is to find relationship between the cluster and the Sagittarius dwarf galaxy. Past studies were mainly devoted to comparing cluster parameters to the Sagittarius dwarf galaxy, however, due to a lack of deeper data, there has been no new progress.

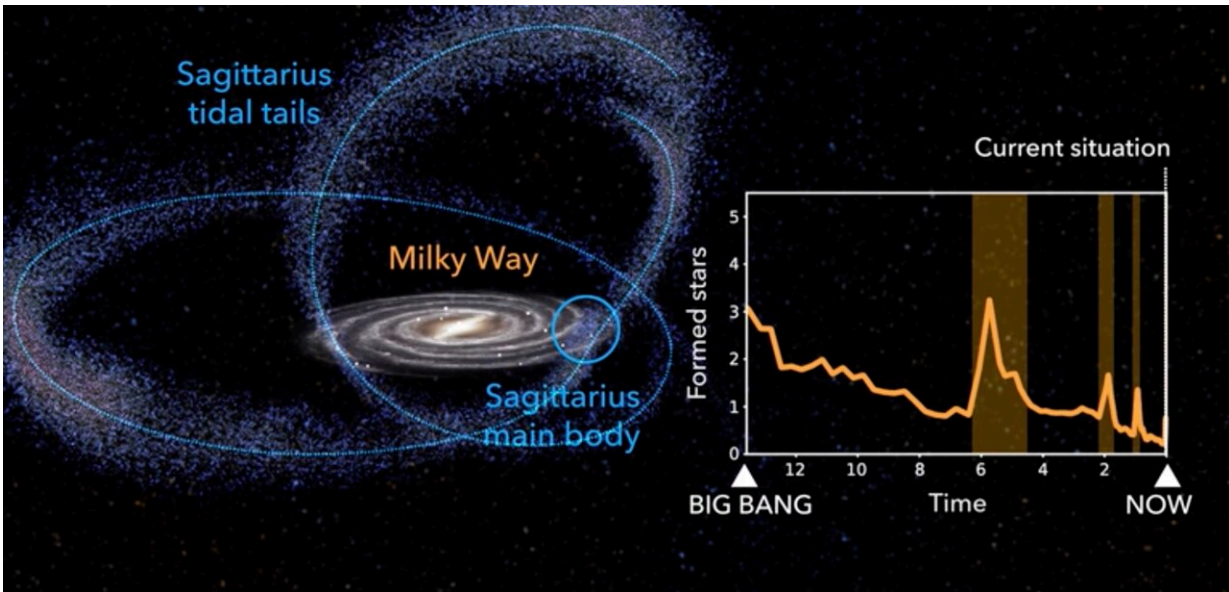


Fig. 2 Sagittarius dwarf galaxy accreted by the Milky Way. Credit: Gabriel Pérez Díaz

Different from these traditional studies, a recent study by Dr. Nie Jundan and her colleagues from the National Astronomical Observatories of the Chinese Academy of Sciences (NAOC) uses a new approach to exploring the origin of Whiting 1 by starting with the morphology of the cluster.

Their results were published in *The Astrophysical Journal*.

"If Whiting 1 is indeed associated with the Sagittarius dwarf galaxy, its morphology should show some tentative spatial connection with its progenitor. But this needs deep data because the cluster is very far away from us," said Dr. Nie, first author of the study.

This research takes the advantage of the data depth of DESI Legacy Imaging Survey to explore potential connections. DESI Legacy Survey is

one of the deepest image surveys currently used and it can reach Whiting 1.

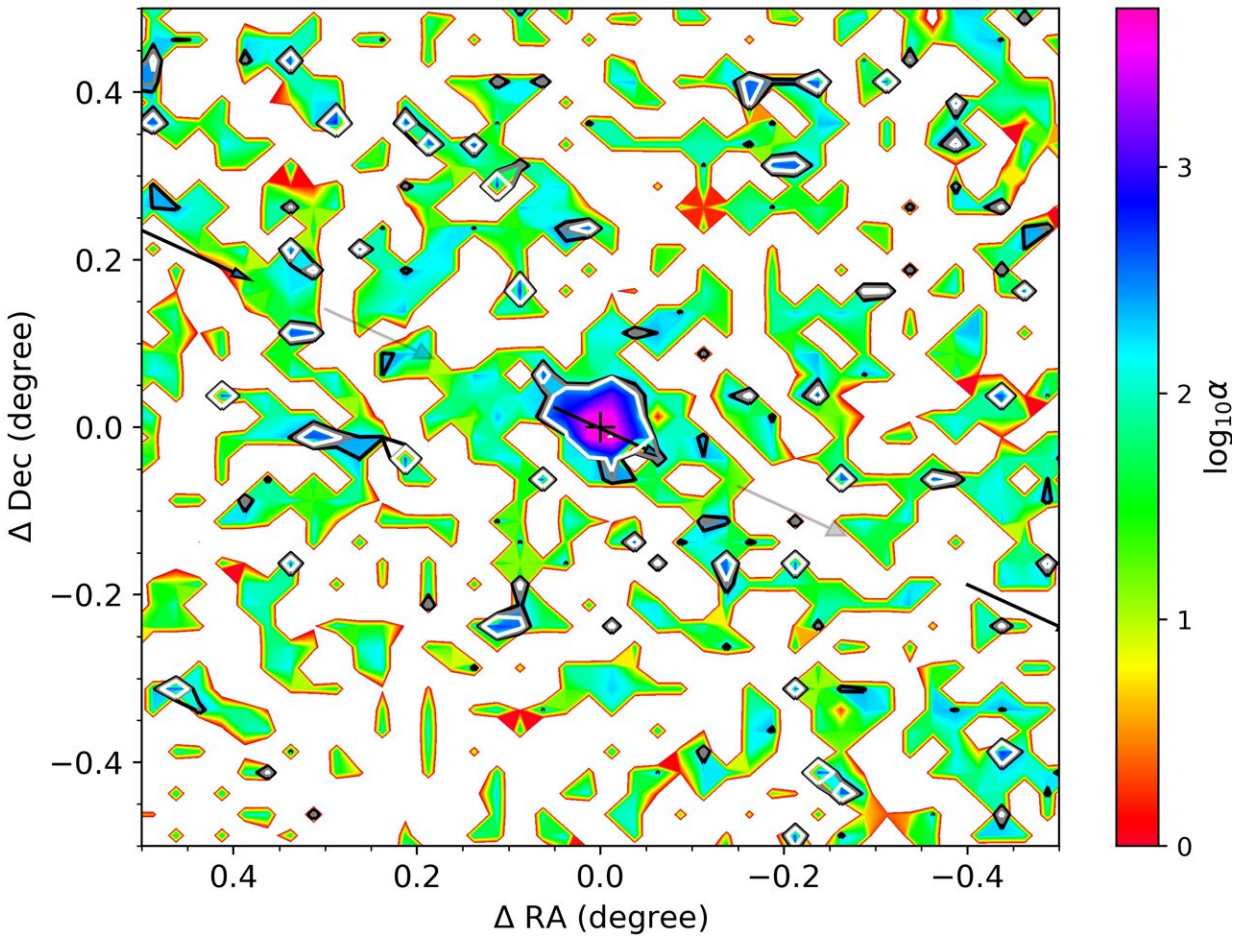


Fig. 3 The raw density map of Whiting 1. Credit: Nie et al.

"With DESI, we can drive straightly to the homeland of Whiting 1. Thus, more members of a common lineage can be discovered. With enough member stars, we can uncover the real face of this cluster," said Dr. Nie.

The research uses the DESI data to filter out all the possible members of



Whiting 1. The two tidal tails on both sides of the cluster are particularly eye-catching. Their shape and extension are direct evidence supporting Whiting 1's association with the Sagittarius dwarf galaxy. It shows that Whiting 1 was a pre-existing globular [cluster](#) in the Sagittarius dwarf galaxy that later immigrated to our galactic halo with its parents.

The intriguing origin of Whiting 1 makes it a perfect source for the study of the formation of galactic clusters, and this work provides additional evidence that a dwarf galaxy can host globular clusters and contribute to the building of the galactic halo.

"With DESI future spectra data, we can further learn how all the children of Whiting 1 play in their yard," said co-author Dr. Zou Hu, who is also a DESI member. "We believe at that time, DESI can explore more than what we currently have."

**More information:** Jundan Nie et al, Searching Extra-tidal Features around the Globular Cluster Whiting 1, *The Astrophysical Journal* (2022). [DOI: 10.3847/1538-4357/ac6264](https://doi.org/10.3847/1538-4357/ac6264)

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