

# Citizen scientist leads discovery of 34 ultracool dwarf binaries using data archive

July 7 2022

---

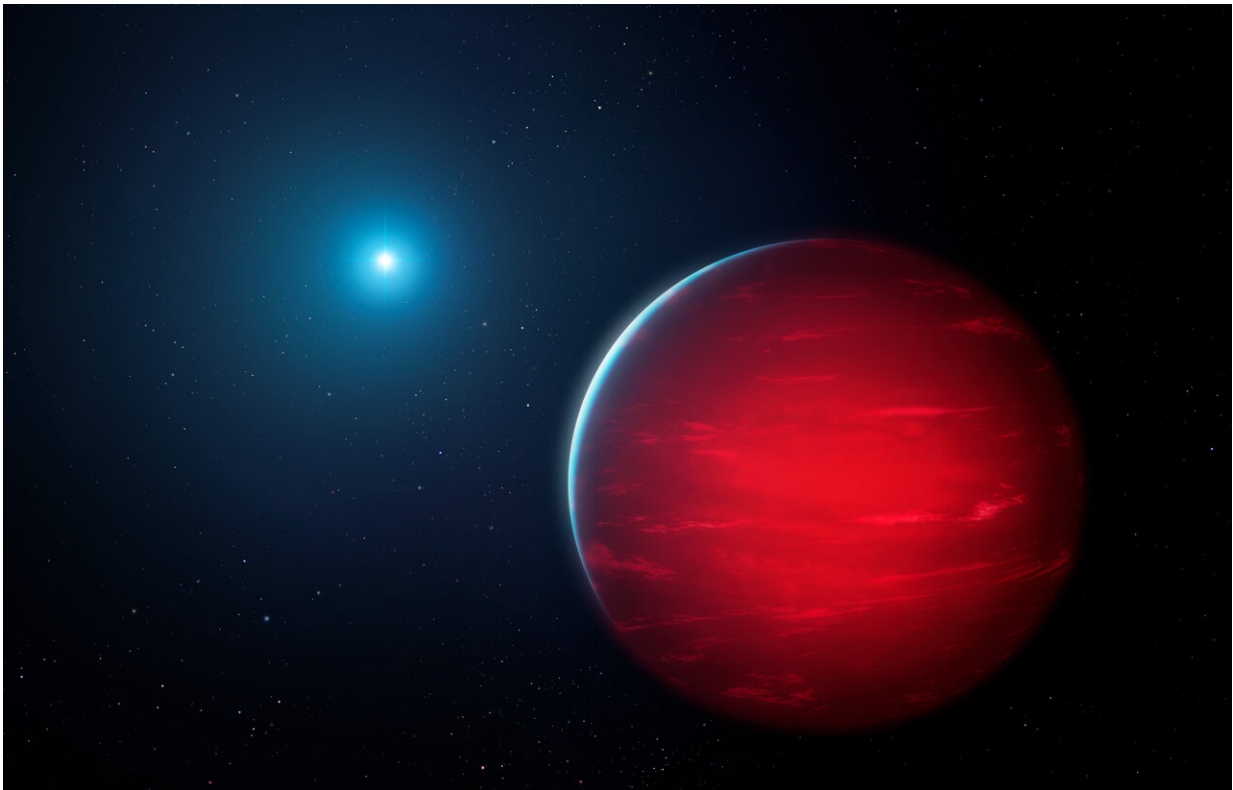


Illustration of an ultracool dwarf with a companion white dwarf. Ace citizen scientist Frank Kiwy used the Astro Data Lab science platform at NSF's NOIRLab to discover 34 new ultracool dwarf binary systems in the sun's neighborhood, nearly doubling the number of such systems known. Credit: NOIRLab/NSF/AURA/M. Garlick

A citizen scientist has searched NSF's NOIRLab's catalog of 4 billion celestial objects, known as NOIRLab Source Catalog DR2, to reveal brown dwarfs with companions. His intensive investigation led to the discovery of 34 ultracool dwarf binary systems, nearly doubling previously known samples.

Brown dwarfs lie somewhere between the most [massive planets](#) and the smallest stars. Lacking the mass needed to sustain nuclear reactions in their core, brown dwarfs loosely resemble cooling embers on a huge scale. Their faintness and relatively small sizes make them difficult to identify. Data from sensitive telescopes have enabled the discovery of several thousand objects but just a small subset have been identified as binaries. The difficulty in observing these faint embers also means that astronomers are still unsure how often brown dwarfs have companions.

To help find brown dwarfs, the astronomers of the Backyard Worlds: Planet 9 citizen science project have previously turned to a worldwide network of more than 100,000 volunteer citizen scientists who scrutinized telescope images to identify the subtle motion of brown dwarfs against background stars. Despite the abilities of machine learning and supercomputers, the human eye is still a unique resource when it comes to scouring telescope images for moving objects.

"The Backyard Worlds project has fostered a diverse community of talented volunteers," commented Aaron Meisner, an astronomer at NSF's NOIRLab and co-founder of Backyard Worlds. "One hundred fifty thousand volunteers across the globe have participated in Backyard Worlds, among which a few hundred 'super users' perform ambitious self-directed research projects."

One such "super sleuth"—citizen scientist Frank Kiwy—embarked on a research project involving the NOIRLab Source Catalog DR2, a catalog of nearly 4 billion unique [celestial objects](#) that contains all of the public

imaging data in NOIRLab's Astro Data Archive. By searching the data for objects with the color of brown dwarfs, Kiwy was able to find more than 2500 potential ultracool dwarfs lurking in the archive. These were then scrutinized for hints of comoving companions, yielding a total of 34 systems comprising a white dwarf or low-mass star with an ultracool dwarf companion. Kiwy then led a team of professional astrophysicists in publishing these discoveries in a scientific paper.

"I love the Backyard Worlds: Planet 9 project. Once you master the regular workflow you can dive much deeper into the subject," commented Kiwy. "If you're a person who is curious and not afraid to learn something new, this might be the right thing for you."

"This amazing result clearly demonstrates that NOIRLab's data archive has a reach far beyond that of professional astronomers," notes Chris Davis, NSF's Program Director for NOIRLab. "Keen members of the public can also participate in cutting-edge research and directly share in the joy of cosmic discovery."

As well as being an inspiring story of [citizen science](#), these discoveries could help astronomers determine whether [brown dwarfs](#) are more akin to oversized planets or undersized stars, as well as providing insights into how star systems evolve over time. It also demonstrates the continued exceptional contribution to astronomy made by scientists using astronomical archives and science platforms such as NOIRLab's Astro Data Archive and Astro Data Lab at the Community Science and Data Center (CSDC).

"These discoveries were made by an amateur astronomer who conquered astronomical big data," concluded Aaron Meisner. "Modern astronomy archives contain an immense treasure trove of data and often harbor major discoveries just waiting to be noticed."

**More information:** Frank Kiwy et al, Discovery of 34 Low-mass Comoving Systems Using NOIRLab Source Catalog DR2, *The Astronomical Journal* (2022). [DOI: 10.3847/1538-3881/ac68e7](https://doi.org/10.3847/1538-3881/ac68e7)

Provided by National Science Foundation

Citation: Citizen scientist leads discovery of 34 ultracool dwarf binaries using data archive (2022, July 7) retrieved 26 June 2024 from <https://phys.org/news/2022-07-citizen-scientist-discovery-ultracool-dwarf.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.