New red galaxies turn out to be already known blue galaxies

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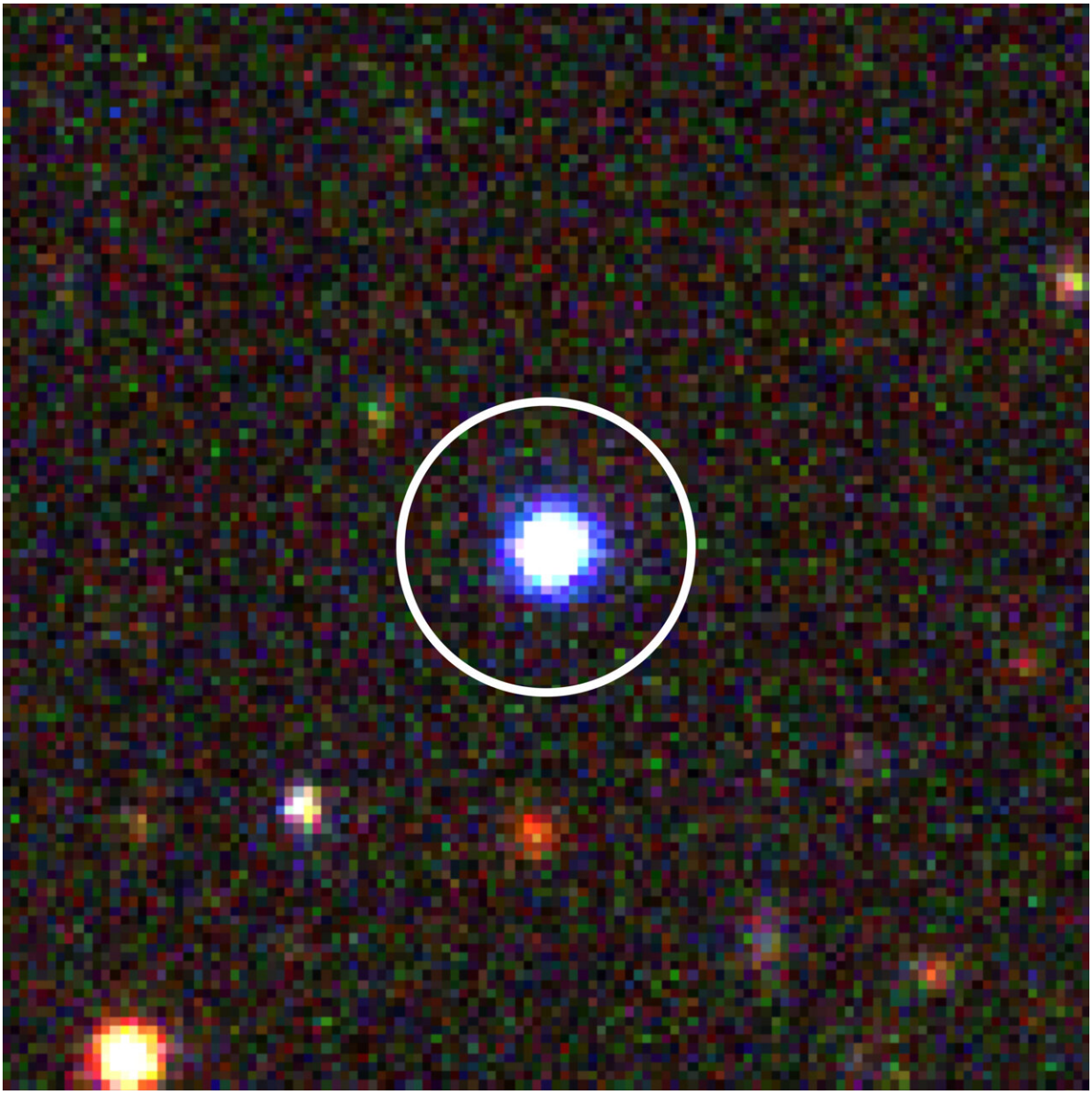

A blue-excess dust obscured galaxy (BluDOG) imaged by the Subaru Telescope. Credit: NAOJ/HSC Collaboration

Not all discoveries turn out to be actual new discoveries. This was the case for the extremely red objects (EROs) found in James Webb Space Telescope (JWST) data. Analysis shows that they are very similar to blue-excess dust obscured galaxies (BluDOGs) already reported in Subaru Telescope data.

Quasars, some of the brightest objects in the universe, are driven by a supermassive black hole with a mass that can reach more than a billion times that of the sun. These objects are the focus of much research, but how they form remains poorly understood.

The prevailing theory is that they form in galaxies with clouds of gas and dust that obscure the growing quasar until it is powerful enough to blast away the clouds. If this is true, it should be able to catch the short timeframe where a quasar breaks out of its cloud.

Because the transition period is short, it is necessary to observe a large number of pre-quasar candidates and hope to get lucky enough to catch a galaxy just as the quasar starts to break out. Looking at data from JWST, a group of extremely red objects (EROs) were identified as possible transitionary quasars.

But then researchers at the Subaru Telescope, a Japanese telescope in Hawai'i, noticed that even though they are called "red," EROs also have a significant blue component, similar to blue-excess dust obscured galaxies (BluDOGs) found in Big Data from the Subaru Telescope and described in a report last year.

Analysis showed that EROs and BluDOGs are likely the same class of objects, but important differences also exist. One possibility is that EROs are in an earlier stage in their evolution than BluDOGs. To determine the true relationship between EROs, BluDOGs, and quasars a larger sample of candidates needs to be collected.

The latest paper is published in *The Astrophysical Journal Letters* with previous findings reported in the *The Astrophysical Journal*.

The larger sample will be studied by the next generation of astronomy instruments including an infrared space telescope project called GREX-PLUS being planned in Japan.

More information: Akatoki Noboriguchi et al, Similarity between Compact Extremely Red Objects Discovered with JWST in Cosmic Dawn and Blue-excess Dust-obscured Galaxies Known in Cosmic Noon, *The Astrophysical Journal Letters* (2023). DOI: 10.3847/2041-8213/ad0e00

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