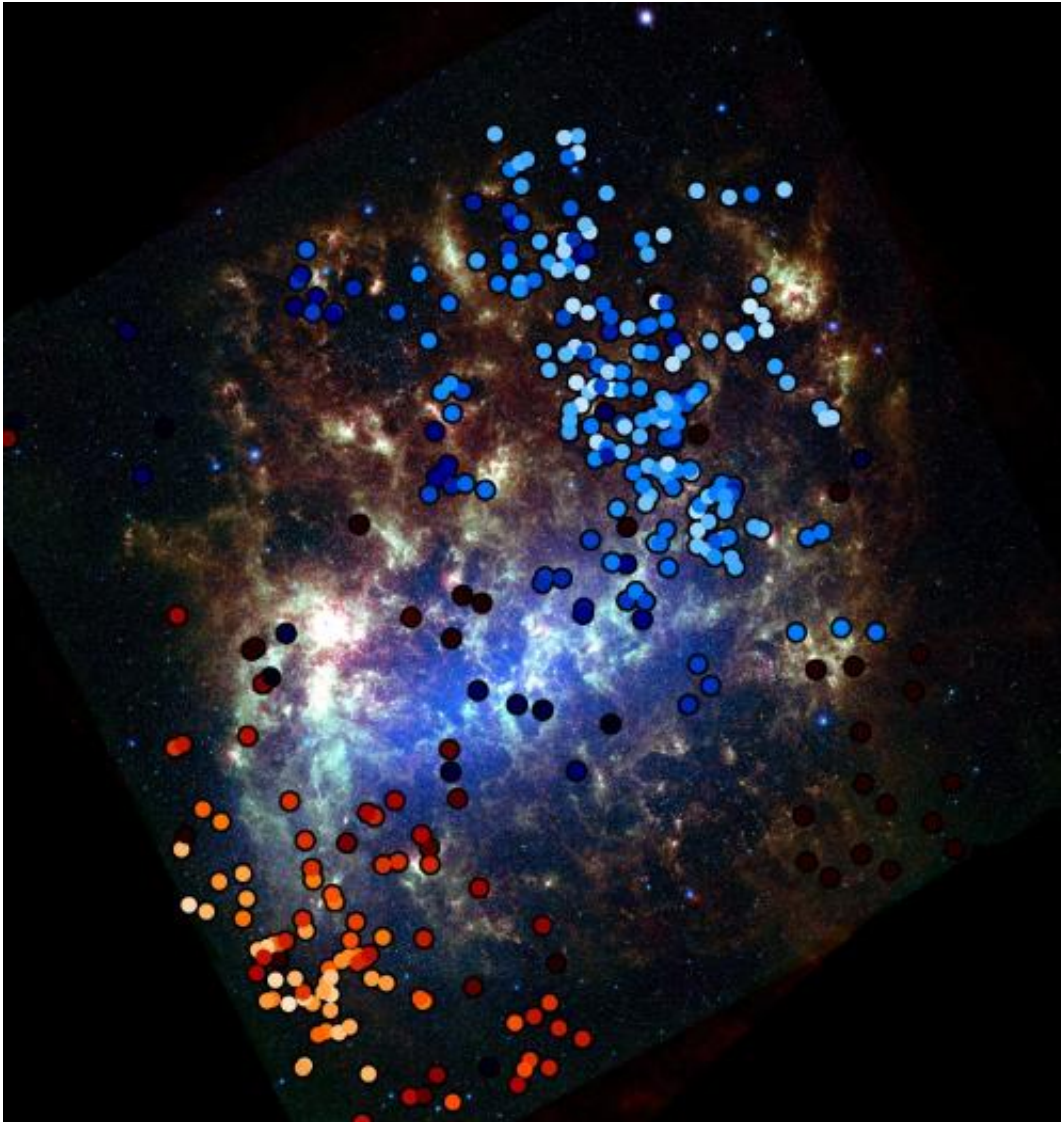


Neighbor galaxy caught stealing stars

July 19 2011



The Milky Way's near neighbor, the Large Magellanic Cloud (LMC), has accreted a smattering of stars from its smaller neighbor, the Small Magellanic Cloud (SMC). In this image, the LMC is shown as it appears in observations by the Spitzer Space Telescope at 3.6, 8.0, and 24 microns. Overlaid in red and

blue, with colors representing the light of sight velocities (red = away, blue = towards) are the locations of stars whose origin has been traced to the SMC. These stars were discovered by a team led by NOAO astronomer Knut Olsen, through analysis of spectra obtained at the CTIO 4-m Blanco telescope. Spitzer image credit: Karl Gordon and Margaret Meixner (Space Telescope Science Institute/AURA/NASA). Compilation by K. Olsen (NOAO/AURA/NSF))

(PhysOrg.com) -- Astronomers from the National Optical Astronomy Observatory (NOAO) and their collaborators have found that hundreds of the stars found in the Large Magellanic Cloud (LMC) were stolen from another nearby galaxy – the Small Magellanic Cloud (SMC). The Large and Small Magellanic Clouds are both neighbor galaxies to our Milky Way Galaxy and easily visible to the unaided eye from the southern hemisphere.

By analyzing the spectra of 5900 giant and supergiant stars in the [Large Magellanic Cloud](#) galaxy, NOAO astronomers Knut Olsen and Bob Blum, and their collaborators Dennis Zaritsky (University of Arizona), and Martha Boyer and Karl Gordon (Space Telescope Science Institute) found that over 5% of the stars they observed in the LMC are rotating counter to the direction of the majority of LMC stars, or perhaps in a plane that is greatly inclined to the rotation of the LMC. An ambiguity remains in the result, because the astronomers were only able to measure the projection of the stellar velocities into the line of sight, and not their full velocity vectors. In either case, these peculiar orbits indicate that these stars probably did not form from the rotating and collapsing cloud of gas that formed the LMC, a galaxy located about 160,000 light years away.

Further examination of these counter-rotating stars revealed another anomaly. The chemical composition of these stars is different. They

have fewer heavy elements such as iron and calcium than typical stars in the Large Magellanic Cloud. However, their composition closely matches that of stars in another [nearby galaxy](#), the Small Magellanic Cloud, whose stars are also depleted in these “metals”.

These two lines of evidence – motion and composition – indicated to the research team that these stars were stolen from the smaller galaxy by the gravitational pull of the larger galaxy. The [astronomers](#) used a multi-object spectrometer on the Cerro Tololo Inter-American Observatory 4-meter Blanco Telescope in Chile to observe 4600 stars. The spectrometer allowed the spectral characteristics of a large number of stars to be observed simultaneously. These observations were then combined with data on 1300 other stars to look for patterns. According to Olsen “It is not always easy to tell whether the stars in a galaxy formed in the galaxy or formed somewhere else and then were captured. Since the LMC is so close to us, we were able to observe a large number of individual stars. And to our surprise, the LMC contained a significant number of stars that must have formed elsewhere.”

The same team is also using infrared observations made with the Spitzer Space Telescope to study how stars form and evolve in the Large Magellanic Cloud. NOAO Deputy Director Bob Blum indicated the importance of this approach: “Using observations with the Spitzer [Space Telescope](#), we were able to get a complete census of the stellar populations in the LMC. With the ground-based observations we could determine the properties and motions of a large sample of stars throughout that galaxy. By combining both, we were able to tell that some of the stars must have come from the neighboring SMC. This led us to a deeper understanding of how [galaxies](#) can and do interact, and change over time.”

This result might also help explain the unusually large amount of star formation in the LMC nebula called 30 Doradus, also known as the

Tarantula Nebula due to its appearance in a small telescope. This area is on the southwestern rim of the Large Magellanic Cloud and is a current hotbed of star formation.

If the 30 Doradus region was in our galaxy and as close to us as the Orion Nebula (the nearest stellar nursery to us), it would have the area of 60 full moons in our sky and its glow would cast shadows on the ground. The 30 Doradus region is located at the position where gas from the Small Magellanic Cloud that is being pulled into the Large Magellanic Cloud along with the captured stars collides with the LMC's own gas at high velocity. The resultant shock wave from this collision of gas pressurizes and concentrates the gas, making star formation much more likely and leading to the formation of large, unstable [stars](#) which can explode, like the famous supernova that appeared in 1987. Remnants from an older supernova have also been found in this region by x-ray telescopes.

More information: This research appears in a paper “A Population Of Accreted Small Magellanic Cloud Stars In The Large Magellanic Cloud” accepted for publication by *The Astrophysical Journal*. The paper authors are: Knut A.G. Olsen, National Optical Astronomy Observatory, Tucson, Arizona Dennis Zaritsky, Steward Observatory, University of Arizona Robert D. Blum, National Optical Astronomy Observatory, Tucson, Arizona Martha L. Boyer, Space Telescope Science Institute, Baltimore, Maryland Karl D. Gordon, Space Telescope Science Institute, Baltimore, Maryland.

Provided by National Optical Astronomy Observatory

Citation: Neighbor galaxy caught stealing stars (2011, July 19) retrieved 28 April 2024 from <https://phys.org/news/2011-07-neighbor-galaxy-caught-stars.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.