

# An abundance of small stars

December 10 2010

---



An optical image of the elliptical galaxy NGC 4472 (Messier 49). New studies find that it has nearly five to ten times as many stars, mostly smaller than the sun, than previously known. Credit: McDonald Observatory

(PhysOrg.com) -- Stars form from giant clouds of gas and dust in space, as the matter in these clouds comes together under the influence of gravity.

A long-standing goal of astronomy has been to determine the population of [stars](#) produced in a cloud; that is, how many stars of various sizes form, and how does this depend on the physical properties of the particular cloud? The initial mass function (IMF) describes this distribution when averaged over the galaxy, and is currently based on observations of stars in our Milky Way.

The observed IMF has relatively few [massive stars](#) (i.e., ones more massive than the sun). Sun-sized stars are comparatively abundant. Stars somewhat smaller than the sun are even more common, but then stars of decreasing mass (down to one-tenth of the sun's mass or even less) decrease in numbers. The precise statistics for low mass stars are uncertain because they are faint and hard to detect. The theoretical assumptions for the IMF are also being debated. Meanwhile astronomers wonder if the IMF of the Milky Way is representative of the IMF elsewhere in the universe.

Apparently not. CfA astronomer Charlie Conroy, together with a colleague, studied the population of low mass stars (smaller than about 0.3 solar-masses) in a set of nearby elliptical galaxies. Although one such star in another galaxy is too far away and faint to be detectable, collectively they were detected by the astronomers because of their diffuse, faint red glow. That starlight has spectral features characteristic of low-mass stars, enabling the scientists to reach a firm conclusion about the stellar masses.

The conclusion was dramatic: nearly 80% of all the stars in these galaxies must be small -- a much larger fraction of small stars than astronomers think exists for the Milky Way. This means that they account for at least 60% of the mass of these galaxies. If these elliptical galaxies are typical, the total number of stars in the universe must be about three times larger than previously estimated. And, not least, the result implies that the IMF for the [Milky Way](#) is not representative of the IMF elsewhere, and so the star forming processes must likewise differ in some important ways.

Provided by Harvard-Smithsonian Center for Astrophysics

Citation: An abundance of small stars (2010, December 10) retrieved 10 April 2024 from

<https://phys.org/news/2010-12-abundance-small-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.