Stars on Diet: Weight Is Limited to 150 Suns, Researchers Find

By WARREN E. LEARY

Published: March 10, 2005

WASHINGTON, March 9 - The universe is full of stars, but there appear to be few really fat ones. Astronomers said Wednesday that there seemed to be a stellar weight limit equivalent to 150 Suns, but no bigger.

Using the Hubble Space Telescope to examine one of the densest clusters of stars in the Milky Way, which should have been brimming with fat stars, astronomers said they found a sharp cutoff in the mass of bodies that form in this stellar nursery.

In examining hundreds of stars in the dense Arches cluster, Dr. Donald F. Figer and colleagues at the Space Telescope Science Institute in Baltimore said they could not find any larger than 130 solar masses, or equal to the mass of 130 of our Suns.

"We are surprised at this result because we expected to find stars up to 500 to 1,000 times more massive than our Sun," Dr. Figer said.

At a telephone news conference organized by the National Aeronautics and Space Administration, experts called the findings a step to understanding star formation.

Dr. Sally Oey of the University of Michigan said that the findings, published in the March 10 issue of the journal Nature, were consistent with studies of smaller star clusters in our galaxy and observations she and colleagues had conducted of a huge star cluster in a galactic neighbor, the Large Magellanic Cloud.

The denser a cluster, the better the chance of finding giant stars, Dr. Oey said.

The Arches cluster that Dr. Figer examined, she said, "is the richest cluster in our galaxy." Because of this, astronomers said, it is highly unlikely that they would find superheavy stars elsewhere.

Astronomers have been uncertain about how massive a star can grow before it cannot hold itself together and blows apart.

Consequently, theories have predicted that stars can be 100 to 1,000 times more massive than the Sun. It has been easier to predict a lower weight limit for stars, experts said, because objects less than one-tenth the mass of our Sun are not heavy enough to sustain nuclear fusion in their cores to shine.

"These are fantastic findings," Dr. Stanford E. Woosley of the University of California, Santa Cruz, said of Dr. Figer's work.

Giant stars, at more than 100 solar masses, are important to galaxies and the universe because their furious combustion produces many important elements to form planets and other bodies like carbon, oxygen, sodium and neon, Dr. Woosley said.

The big stars also are short-lived, he said, with no star more than 100 solar masses lasting more than three million years because they consume their fuel so rapidly.

The Sun, by contrast, is 4.55 billion years old and expected to last 5 billion more years before running out of fuel. In mass, the Sun is equal to 300,000 planets the size of the Earth.

Dr. Figer said that although he found no star bigger than 130 solar masses in his observations, he set the upper limit for a big star at 150 solar masses to be conservative.

ARTICLE TOOLS

E-Mail This

Printer-Friendly Format

Most E-Mailed Articles

Reprints & Permissions

Most E-Mailed

1. Mumbai to Midtown, Chaat Hits the Spot
2. Colicky Baby? Read This Before Calling an Exorcist
3. Bankruptcy Bill Set for Passage; Victory for Bush
4. Op-Ed Columnist: Homegrown Osamas
5. Doctors' Journal Says Computing Is No Panacea

Go to Complete List