

## Sagittarius Dwarf Elliptical Galaxy (SagDEG)

*Chicken Little was right. The sky is falling.*

Thousands of stars stripped from the nearby Sagittarius dwarf galaxy are streaming through our vicinity of the Milky Way galaxy, according to a new view of the local universe constructed by a team of astronomers from the University of Virginia and the University of Massachusetts.

Majewski and his colleagues have been surprised by the Earth's proximity to a portion of the Sagittarius 'debris' (stars, planets and *invisible dark matter*) :

"This first full-sky map of Sagittarius shows its extensive interaction with the Milky Way," Majewski said. Both stars and star clusters now in the outer parts of the Milky Way have been acquired from the Sagittarius Dwarf Elliptical Galaxy.

"For only a few percent of its 240 million-year orbit in the Milky Way galaxy does our Solar System pass through the path of Sagittarius 'debris'," Majewski said. "Remarkably, stars from Sagittarius are now raining down onto our present position in the Milky Way. Stars from an 'alien' galaxy are relatively near us. We have to re-think our assumptions about the Milky Way galaxy to account for this."

"The observations provide new insights into the nature of the mysterious dark matter," said Princeton's Spergel. "Either our galaxy is unusual or the dark matter has richer properties than postulated by conventional models."

"The shape of the Sagittarius debris trail shows us that the Milky Way's unseen dark matter is in a spherical distribution, a result that is quite unexpected," Weinberg said.

Large, infrared-bright stars are populous in the Sagittarius galaxy but uncommon in the outer Milky Way. The 2MASS infrared map of M giant stars analyzed by Majewski and collaborators is the first to give a complete view of the Sagittarius stars, now wrapping like a spaghetti noodle around and in a small portion of the Milky Way galaxy.

"If people had infrared-sensitive eyes, the entrails of Sagittarius would be a prominent fixture sweeping across our sky," Majewski said. "But at human, visual wavelengths, they become buried among countless intervening stars and obscuring dust. The great expanse of the Sagittarius system has been hidden from view."

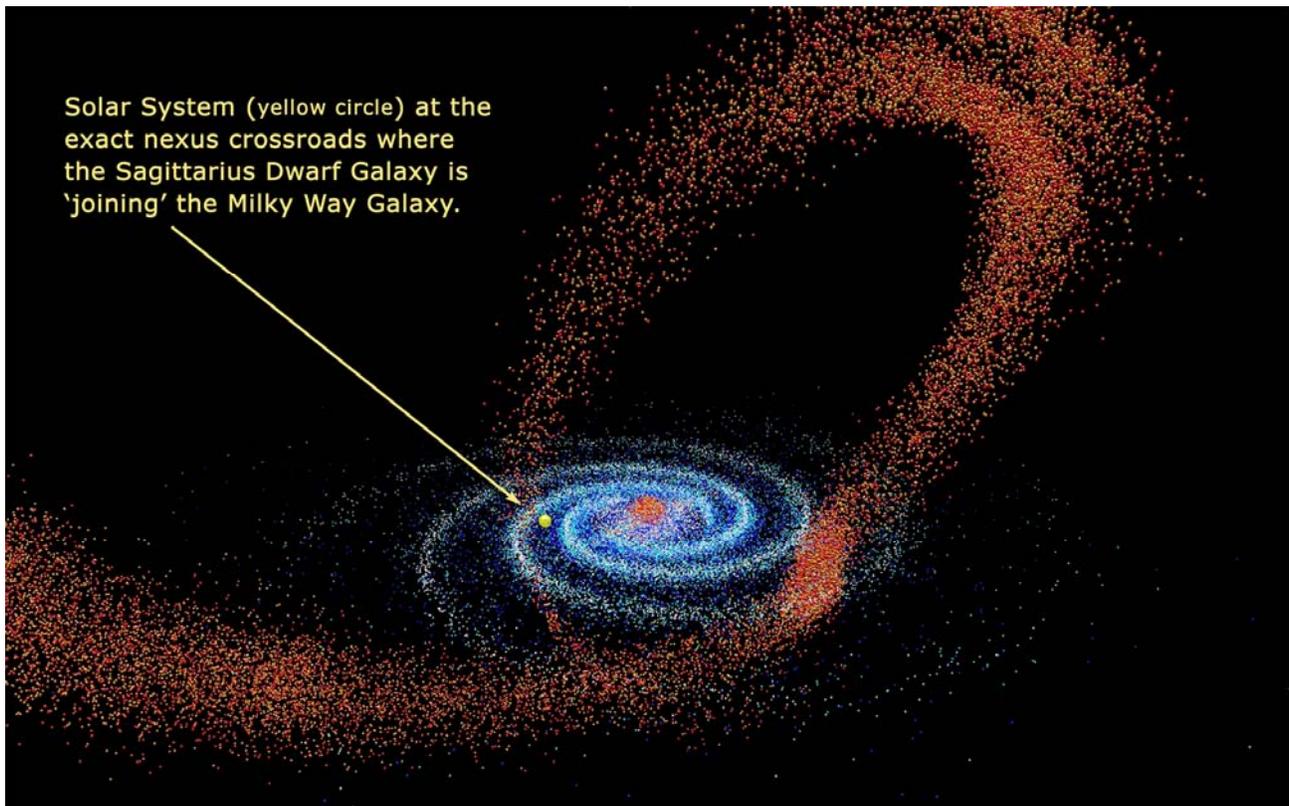
Prior to this work, astronomers had detected only a few scattered pieces of the disrupted Sagittarius dwarf. Even the existence of Sagittarius was unknown until the heart of this nearby satellite galaxy of the Milky Way was discovered by a British team of astronomers in 1994.

"We sifted several thousand interesting stars from a catalog of half a billion," said co-author Michael Skrutskie, University of Virginia professor of astronomy and principal investigator for the 2MASS project. "By tuning our maps of the sky to the 'right' kind of star, the Sagittarius system jumped into view."

Further discoveries by astrophysics teams from both the University of Massachusetts and the U. of Virginia, drawing upon the 2MASS Two-Micron All Sky Infrared Survey data, revealed the entire loop-shaped structure. In 2003 with the aid of infrared telescopes and super computers, the team was able to help create a new star map distinguishing the presence of the Sagittarius Dwarf Elliptical Galaxy (SagDEG), position and looping shape out from the mass of background stars, and found this smaller galaxy to be at a near right angle to the plane of the Milky Way Galaxy.

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**2MASS** was a joint project of the University of Massachusetts and the Infrared Processing and Analysis Center / California Institute of Technology. The National Aeronautics and Space Administration, and the National Science Foundation funded the project. Additional funding for the Sagittarius study with 2MASS came from the David and Lucile Packard Foundation and the Research Corporation.



Although it is one of the closest companion galaxies to the Milky Way, the main parent cluster is on the opposite side of the galactic core from Earth, and consequently is very faint, although it covers a large area of the sky. Officially discovered in 1994, SagDEG appears to be an older galaxy, with little interstellar dust and composed largely of Population II stars, older and metal-poor compared to the Milky Way.

In 1998 a team of astronomers estimated that SagDEG orbits the Milky Way in less than a billion years, and that SagDEG must have already passed the dense central region of the Milky Way at least ten times. To have held onto so many of its stars for so long, in spite of the Milky Way Galaxy's strong gravitational pull, astronomers now suspect that SagDEG has more *dark matter* than was originally suspected.

Astrophysicist Rosemary Wyse of Johns Hopkins University has estimated that as much as 10 percent of the stars in the Milky Way's halo came from dwarf galaxies like SagDEG, merging with the Milky Way Galaxy over the past eight billion years or so. [Is our Sun one of these 'alien' stars?]

### Born of the Magellanic Clouds?

Since the discovery of SagDEG, researchers have noticed that some of its stars are strikingly similar to stars in the *Large Magellanic Cloud* (LMC), another nearby satellite galaxy that is located slightly farther out from the Milky Way. Recently, a team led by Patrick Cseresnjes of the Paris Observatory. found strong similarities in a certain class of highly evolved old stars seen in both of these satellite galaxies. The evidence suggests that both satellites may have a common

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The **Sagittarius Dwarf Elliptical Galaxy** (SagDEG) is an elliptically looped shaped satellite galaxy of the Milky Way Galaxy. The main cluster is roughly 10,000 light-years in diameter, and is currently about 70,000 light-years from Earth and traveling in a polar orbit at a distance of about 50,000 light-years from the core of the Milky Way (about 1/3 the distance of the Large Magellanic Cloud). SagDEG should not be confused with SagDIG, the Sagittarius Dwarf Irregular Galaxy, a small galaxy over 4 million light-years distant.

galactic ancestor, a larger galaxy that was ripped apart to form both the Large Magellanic Cloud and the closer SagDEG. '*RR Lyrae variable stars*' are ancient, more than 10 billion years old, and so they provide clues about the environments from which they originated. Most important, these stars vary in brightness. In studying the period of this variation, Cseresnje found a significant similarity in the distribution of 2,000 RR Lyrae stars with similar periods in both SagDEG and the LMC.

Variable stars in these two satellite galaxies are not so similar to those in other neighboring galaxies. The similarity between SagDEG and the LMC is not restricted to RR Lyrae stars. It has also been observed through other stellar populations like *Carbon* stars and *Red Giant Branch* stars. These similarities strongly suggest that both galaxies have similar stellar populations.

### **RR Lyrae Variable Stars**

This type of variable star is named after the *variable RR in the Lyra constellation*. The field star RR Lyrae was found to be variable in 1899 by Willamina Fleming of the Harvard College Observatory. RR Lyrae are very evolved stars and are all very old, much older than our Sun.

RR Lyrae are short-period, pulsating, white giant stars, usually of spectral class A. They are pulsating Horizontal branch stars, with a mass of around half the Sun's. RR Lyrae stars shed mass prior to becoming RR Lyrae, and consequently, RR Lyrae are relatively low mass stars which were once stars with similar or slightly less mass than the Sun. The average absolute magnitude of an RR Lyrae is 0.75, only 40 or 50 times brighter than the Sun. Their period is shorter, typically less than one day, and sometimes as little as to eight or nine hours.

They have long been recognized to be excellent tracers of *old stellar populations*. They are in a stage of their life where they have expended the hydrogen in their core and are now burning helium into carbon through nuclear fusion processes. Our Sun burns hydrogen in its core into helium to produce energy. Also, RR Lyrae variable stars pulsate, changing their brightness and their size. As the primary distance indicators in the Milky Way Galaxy and in the Magellanic Clouds, RR Lyrae stars are our cornerstones for the observation of cosmological space-time.

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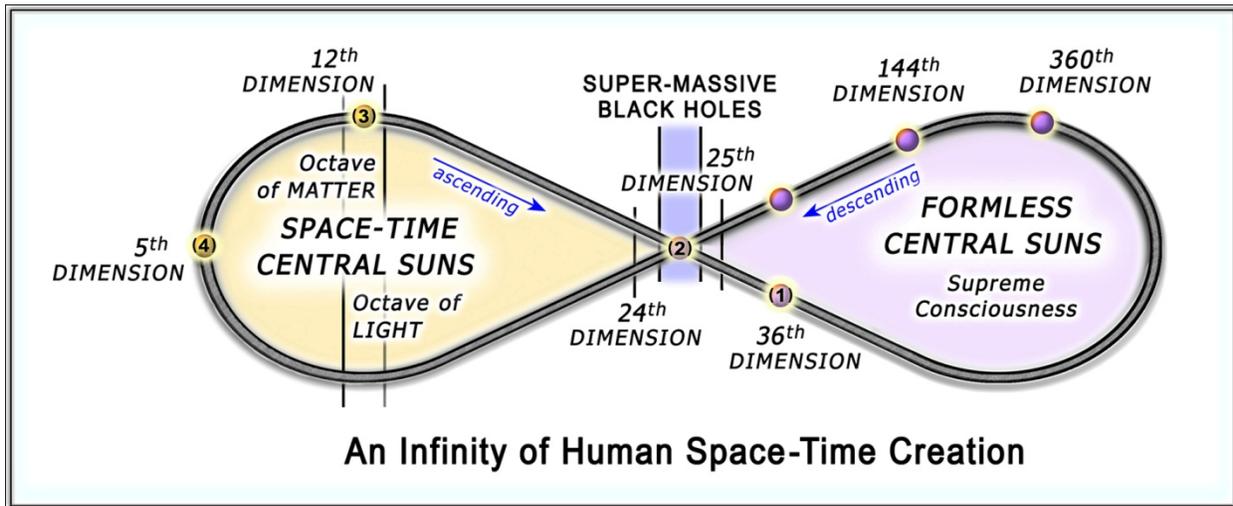
Whether it's truly a crisis in cosmology or just a matter of incomplete knowledge, astronomers are up against a conundrum: The universe, according to several observations, appears to be younger than its oldest stars. To resolve this paradox, researchers must prove that the universe is older than recent estimates of 9 to 11 billion years or that the oldest stars in our galaxy are younger than 12 to 18 billion years.

**Within the bright region at the center of the Milky Way galaxy  
is the supermassive black hole known as Sagittarius A\*  
(Sgr A\* - pronounced "Sag A Star")**

The epic galactic cycles of Lyren evolution spans 86 billion years across four galaxies. All but the Milky Way have now ascended into dark matter. The LYREN galaxy<sup>(3)</sup>, one of the recent galactic ancestors of the Milky Way, purged its coarse matter 26 million years ago as it morphed into dark matter in the 12<sup>th</sup> dimension. It is now beginning its ascent into the Octave of Light.

The Milky Way<sup>(4)</sup> and the Solar system are currently centered in the 5<sup>th</sup> dimension to the far left in the Octave of Matter, along with the oldest solid-matter planets, such as the Earth, which are all about 5 billion years old.

The 2<sup>nd</sup> Galaxy purged and became dark matter 22.5 billion years ago. It is now in the 24<sup>th</sup> dimension, having completed its ascension through space-time. This is the cosmic moment in the galactic cycle when it will move through the supermassive black hole to enter the 25<sup>th</sup> dimension, the first level of formless Supreme Consciousness within the Great Central Sun.



The 1<sup>st</sup> Galaxy passed into dark matter 44.5 billion years ago, and 22.5 billion years ago entered into the first pure spirit level. It is now at the 36<sup>th</sup> dimensional level in the Great Central Sun. This is *Nokodemion's* home galaxy – a galaxy of 87 billion years – where this legendary creator emerged and ascended within space-time for 64 billion years, before rapidly moving through the '*Sagittarius stargate*' (the super-massive black hole of our Great Central Sun) to become the evolutionary guardian spirit to his engendered, witnessed and created peoples.

Nokodemion returned from the formless void to the material state 12 billion years ago to recreate order among his peoples in the LYREN galaxy. Then, after space-shifted regions in the Milky Way had become habitable, he came with his peoples to the worlds of the Lyra and Vega star systems. This was Nokodemion's third exodus from galaxies and planets which purged and ascended as dark matter.

The signature of the presence of the LYREN galaxy in dark matter is seen in the remaining ancient RR Lyrae variable stars. These variable stars are over 10 billion years old, roughly twice the age of the Milky Way galaxy and our Sun. A significant similarity in the distribution of 2,000 RR Lyrae stars has already been found, with similar periods in both SagDEG and the Large Magellanic Cloud (LMC), another nearby satellite galaxy of the Milky Way. This naturally has led to searches for strong similarities in other highly evolved old stars, and to the identification of additional 'satellite galaxies' within the Local Group that have emerged, as star clusters with the same similarities are found.

All of this suggests the presence of common galactic ancestors, perhaps even the presence of an invisible Great Central Sun, as is suggested in this diagram. Once these coherent groupings are discovered and validated, standard scientific progressions of the digital basis sets will allow for the creation of Local Group theories of dark matter and the *Great Central SUN "that Rules them All"*.

***"From the Dark Ages to the dark matter that rules all Creation with Love (coherent attraction)."***