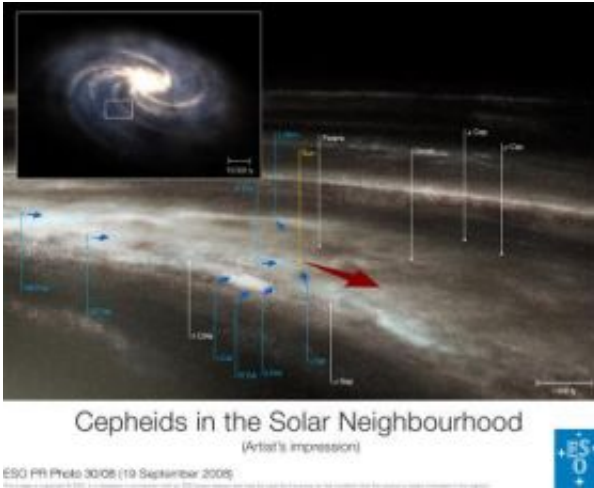


Pinning down the Milky Way's spin

September 19 2008



Artist's impression of the local neighbourhood of the Sun and its setting within our galaxy, the Milky Way (see insert above). The figure shows the positions of some bright stars (in white) in the sky as well as the eight Cepheids used in the investigation (in blue). After the rotation of the Milky Way had been accounted for (red arrow), it seemed that the Cepheids were all "falling" towards the Sun (blue arrows; these are not to scale: in reality the blue velocities are typically a factor one hundred smaller than the velocity around the Milky Way). New, very precise measurements with the HARPS instrument have shown that this apparent "fall" is due to effects within the Cepheids themselves and is not related to the way the Milky Way rotates. The motion indicated by the blue arrows is thus an illusion. The scale of the image is given in light-years (ly). Credit: ESO

New, very precise measurements have shown that the rotation of the Milky Way is simpler than previously thought. A remarkable result from the most successful ESO instrument HARPS, shows that a much

debated, apparent 'fall' of neighbourhood Cepheid stars towards our Sun stems from an intrinsic property of the Cepheids themselves.

The result, obtained by a group of astrophysicists led by Nicolas Nardetto, will soon appear in the journal *Astronomy & Astrophysics*.

Since Henrietta Leavitt's discovery of their unique properties in 1912, the class of bright, pulsating stars known as Cepheids has been used as a distance indicator. Combined with velocity measurements, the properties of Cepheids are also an extremely valuable tool in investigations of how our galaxy, the Milky Way, rotates.

"The motion of Milky Way Cepheids is confusing and has led to disagreement among researchers," says Nardetto. "If the rotation of the Galaxy is taken into account, the Cepheids appear to 'fall' towards the Sun with a mean velocity of about 2 km/s."

A debate has raged for decades as to whether this phenomenon was truly related to the actual motion of the Cepheids and, consequently, to a complicated rotating pattern of our galaxy, or if it was the result of effects within the atmospheres of the Cepheids.

Nardetto and his colleagues observed eight Cepheids with the high precision HARPS spectrograph, attached to the 3.6-m ESO telescope at La Silla, 2400 m up in the mountains of the Chilean Atacama Desert. HARPS, or the High Accuracy Radial Velocity Planetary Searcher, is best known as a very successful planet hunter, but it can also be used to resolve other complicated cases, where its ability to determine radial velocities - the speed with which something is moving towards or away from us - with phenomenally high accuracy is invaluable. "Our observations show that this apparent motion towards us almost certainly stems from an intrinsic property of Cepheids," says Nardetto.

The astronomers found that the deviations in the measured velocity of Cepheids were linked to the chemical elements in the atmospheres of the Cepheids considered. "This result, if generalised to all Cepheids, implies that the rotation of the Milky Way is simpler than previously thought, and is certainly symmetrical about an axis," concludes Nardetto.

Source: ESO

Citation: Pinning down the Milky Way's spin (2008, September 19) retrieved 9 April 2024 from <https://phys.org/news/2008-09-pinning-milky.html>

| |
|--|
| <p>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.</p> |
|--|