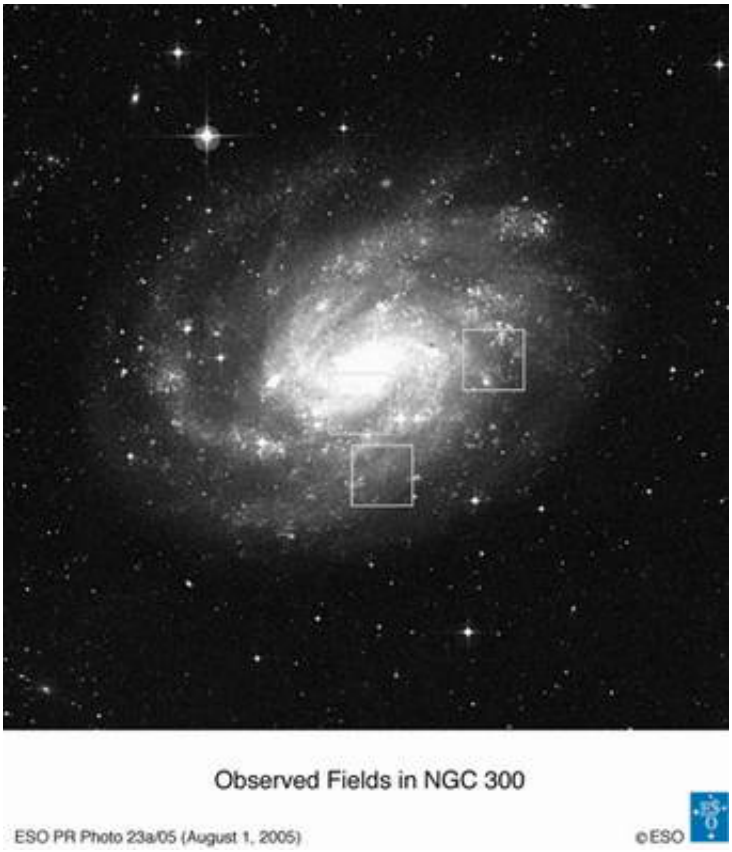
Moving Closer to the Grand Spiral

August 1 2005



An international team of astronomers from Chile, Europe and North America is announcing the most accurate distance yet measured to a galaxy beyond our Milky Way's close neighbours. The distance was determined using the brightness variation of a type of stars known as "Cepheid variables".

Image: Observed Fields in NGC 300

The team used the ISAAC near-infrared camera and spectrometer on ESO's 8.2-m VLT Antu telescope to obtain deep images in the near-infrared of three fields in the spiral galaxy NGC 300. Together these fields contain 16 long-period Cepheids. These stars had previously been discovered by the team in a wide-field imaging survey of this galaxy conducted with the Wide Field Imager (WFI) camera on the ESO/MPG 2.2-m telescope at La Silla.

The spiral galaxy NGC 300 is a beautiful representative of its class, a Milky-Way-like member of the prominent Sculptor group of galaxies in the southern constellation of the same name.

The astronomers derive a distance to NGC 300 of a little above 6 million light-years. (This distance determination is tied to an assumed distance of 163,000 light-years to the Large Magellanic Cloud (LMC). The accurate measurement of the LMC distance itself to which the extragalactic distance scale is currently tied will still require years of hard work)

"The VLT data have led to accurate period-luminosity relations in the J- and K- bands, allowing us to determine the distance to NGC 300 with an unprecedented uncertainty of only three percent", says Wolfgang Gieren, of the University of Concepcion (Chile) and leader of the team. One of the reasons for this high accuracy was the opportunity to precisely combine the new near-infrared ISAAC data with the previous optical WFI data.

Cepheid variables constitute a key element in the measurement of distances in the Universe. It has been known for many years that the pulsation period of a Cepheid-type star depends on its intrinsic brightness (its "luminosity"). Thus, once its period has been measured,

the astronomers can calculate its luminosity. By comparing this to the star's apparent brightness in the sky, they can obtain the distance to the star. This fundamental method has allowed some of the most reliable measurements of distances in the Universe and has been essential for all kinds of astrophysics, from the closest stars to the remotest galaxies.

This first Cepheid distance based on near-infrared imaging with the Very Large Telescope is a milestone in the team's Araucaria Project in which they seek to improve the local calibration of the distance scale with stellar standard candles, including Cepheid variables, by determining precisely how these standard candles depend on a galaxy's properties, such as its content in chemical elements and age.

Source: ESO