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Composite image showing the relative position of the WMAP probe on April 5 ESO

[ESA Spying on WMAP in Preparation for Gaia](#)

Gaia will make a 3D map of the Milky Way

How does the ESA prepare for the launch of a new probe? Well, apparently, by taking several pictures of its partner's spacecraft. ESO's La Silla 2.2 meter telescope was recently used by three researchers to photograph NASA's Wilkinson Microwave Anisotropy Probe, orbiting Earth from a distance of 1.5 million kilometers. The two missions have separate scientific objectives, with NASA WMAP probe having the role of making observations on the Cosmic Microwave Background.

Europe's Gaia mission on the other hand, will focus on making a precise three dimensional map of the Milky Way by detecting the position and the motion of all the stars on the sky. This would mean that the speed of the spacecraft through the solar system would have to be known within 2.5 millimeters per second to one, or one part in 10 million, while its position to one part in a thousand million.

This will be done only through usual satellite tracking techniques or by reflecting sunlight from the spacecraft back to Earth. This way, the spacecraft would be tracked by monitoring its movement in the background of stars. The technique was first proposed by Ulrich Bastian from ARI, Heidelberg, and has again been brought to life by Martin Altmann in the hope that it would be used as a ground-based optical tracking technique during Gaia's five year mission.

But before the system is implemented, it must be tested. Introducing NASA's WMAP probe that orbits Earth from a position rather similar to that of Gaia during its mission. The sunshield it carries not only protects it from the sun, but it also generates electric energy with the help of the solar panels posted on it and can act as light reflector for tracking purposes. It measures 4.5 meters across and is tilted to 22.5 degrees relative to the Sun's position.

Gaia's sunshield however will be 11 meters across and tilted to 45 degrees, which will allow it to appear on the night sky 1.5 to 2 magnitudes brighter than the WMAP probe.

The image showing the WMAP in the stellar background was taken by Sebastien Bouquillon, Ricky Smart and Alexandre Andrei on April 5 and it is a composite of three images taken at time intervals a few minutes apart. You can see the WMAP probe below the brightest star in the center-right position of the image as a series of three colored points – from left to right red, green and blue. This coloring was done artificially for better observation.

Following a straight light line to the right from the relative position of the WMAP probe will reveal a small dot of light, a galaxy in the star background.