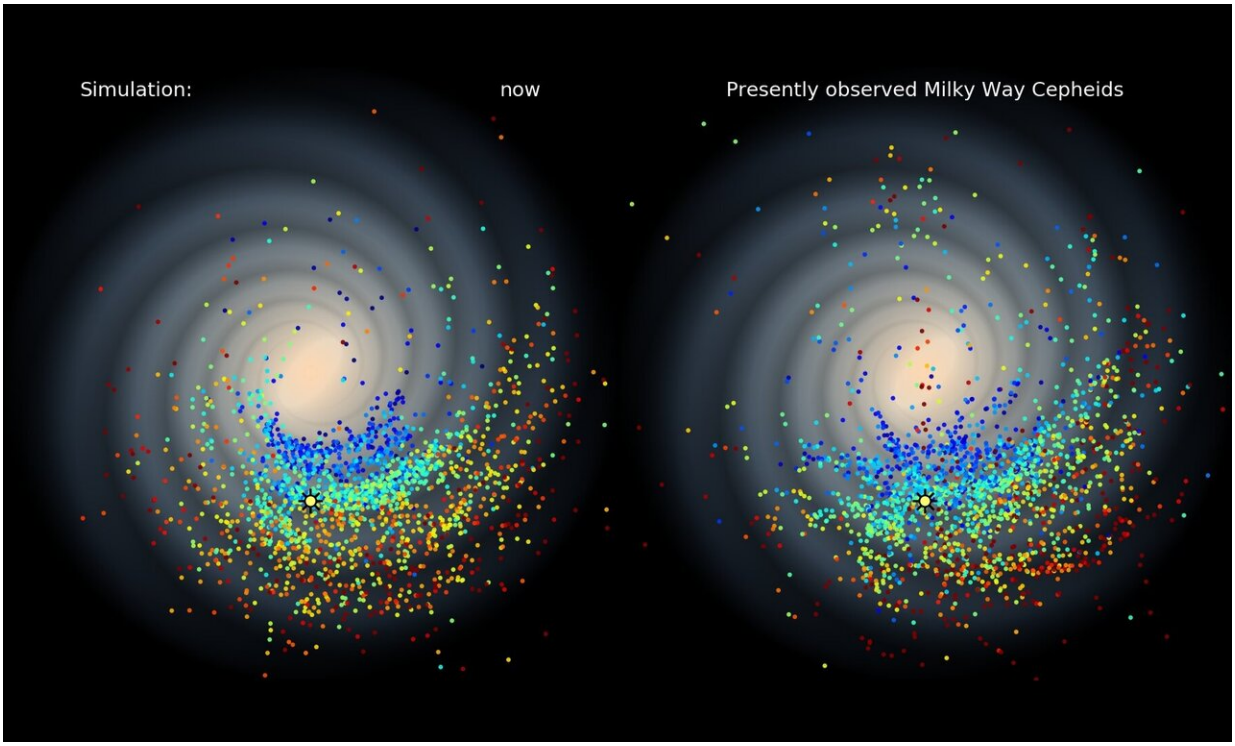
A 3-D model of the Milky Way Galaxy using data from Cepheids

August 2 2019, by Bob Yirka



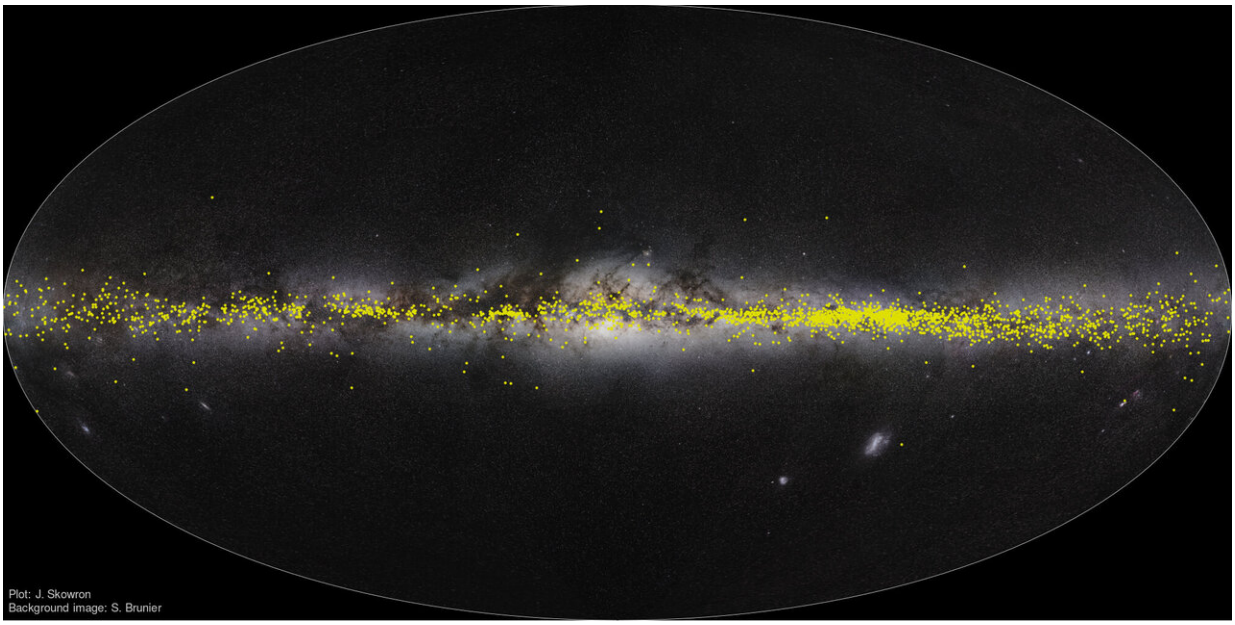
Comparison of simulation of three main star forming episodes in the spiral arms with the currently observed Cepheid variables. Oldest stars (red) are 400 million years old and the youngest (blue) are 30 million years old. Top view of the Milky Way, simulations are shown in the left panel, observations – in the right panel. Credit: J. Skowron / OGLE / Astronomical Observatory, University of Warsaw

A team of researchers at the University of Warsaw has created the most

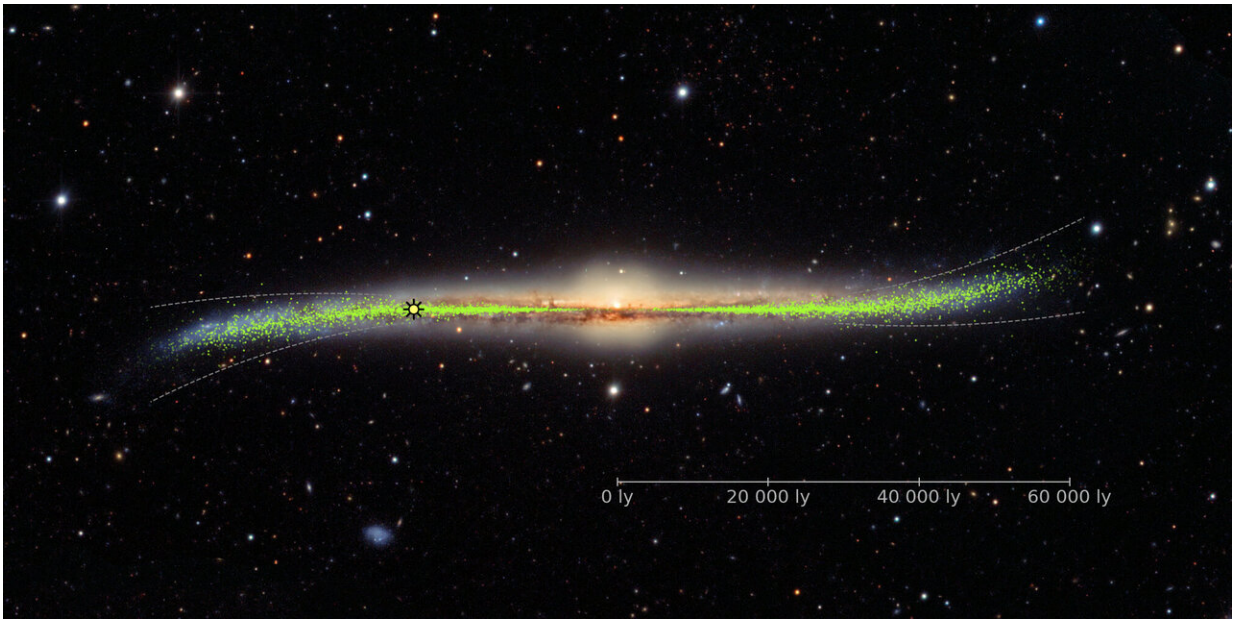
accurate 3-D model of the Milky Way Galaxy to date. In their paper published in the journal *Science*, the group explains how they used measurements from a special group of pulsating stars to create the map.

Most people imagine the Milky Way as a flat spiral—that is the way it has been shown in school textbooks for years. In more recent times, however, scientists have discovered that our galaxy is not flat at all—it is more like a wobbly uncooked pizza crust that has been tossed into the air. In this new effort, the researchers have found that our galaxy is even more wobbly than has been suspected.

To create their new map, the researchers used data from the Optical Gravitational Lensing Experiment—a long term sky surveying project based at the University of Warsaw. More specifically, the researchers wanted data regarding Cepheids, which are a unique type of pulsating star. They were useful to the researchers because they pulse with regularity and brightness. This means that their true brightness can be calculated and compared to the brightness of them as seen here from Earth—doing so allows for very accurately measuring how far away from us they are. By amassing data from 2,431 Cepheids (collected over six years) and putting them all on a map together, the researchers were able to produce a 3-D representation of the Milky Way, at least from the perspective of Cepheids. The model they created is the first to be built using direct measurements of star distances, thus it is the most accurate to date.



Milky Way Cepheids on the Milky Way map. Credit: Plot by J. Skowron / OGLE, the Milky Way panorama by Serge Brunier



Warped galaxy with the distribution of young stars (Cepheids) in its disk as

inferred from the Milky Way Cepheids. Credit: J. Skowron / OGLE / Astronomical Observatory, University of Warsaw

In studying the 3-D model they had created, the researchers were able to see that the Milky Way is far from flat. They could also see that it gets less flat the farther from the sun it goes. They noted also that the Cepheids appeared to be grouped into clusters, suggesting that they may have formed at or near the same time. The researchers also suggest the warping was likely caused by interactions with other galaxies, dark matter or intergalactic gas.

More information: Dorota M. Skowron et al. A three-dimensional map of the Milky Way using classical Cepheid variable stars, *Science* (2019). DOI: 10.1126/science.aau3181