

# PHYSICS AND ASTRONOMY COLLOQUIUM

## Beth Willman, Ph.D.

Large Synoptic Survey Telescope/Steward Observatory

### The Nearby Universe as a Cosmological Lens

For all of history, humans have been able to see a milky structure encircling our night sky - our home galaxy, the Milky Way. However, only in the early 20th century did humans learn that the Milky Way was not the only galaxy in the Universe. We now know that the Sun is but one of hundreds of billions of stars in the Milky Way galaxy, and the Milky Way galaxy is but one of hundreds of billions of galaxies in the Universe. This evolution in thought has been enabled by making maps of our cosmic surroundings - of increasing fidelity and increasing volume. Large-scale digital surveys of the last 20 years, such as the Sloan Digital Sky Survey and the Dark Energy Survey, have accelerated this progress. We now use the Milky



Way as a lens through which we learn about galaxy formation and dark matter. In the near future, the Large Synoptic Survey Telescope will enable another giant leap forward in our ability to map the nearby Universe and then use these maps to study cosmological questions.

In this talk, I will highlight observational progress in our understanding of (i) the Milky Way and its neighbors and (ii) the limiting impacts of sample biases. I will present new predictions for the number of Milky Way dwarf galaxies expected to be discovered by the Dark Energy Survey and Large Synoptic Survey Telescope and the complementary discovery volume to be provided by other galaxies in the Local Volume.

**THURSDAY, SEPTEMBER 17, 2015 | 4:00 PM | HAWKING AUDITORIUM**



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