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Tidal Streams, Dark Matter, and volunteer Computing with Milkyway@home

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Dr. Newberg received her PhD in Physics from the University of California at Berkeley in 1992. She then became one of the first postdoctoral researchers in the Sloan Digital Sky Survey (SDSS). She used data from the SDSS to map the positions of stars in the Milky Way galaxy, and discovered that the density of stars in the outer parts of our galaxy is lumpy. Newberg currently heads the Participants in LAMOST, US group, which is partnering with the Large Area Multi-Object fiber Spectrographic Telescope (LAMOST). Her current research is primarily related to understanding the structure of our own galaxy through using A stars as tracers of the galactic halo, and using photometrically determined metallicities of main sequence F-K stars to determine whether the thick disk is chemically distinct from the thin disk and galactic halo of our galaxy. I hope that these studies will contribute to our understanding of how the Galaxy formed. In addition to her research, Dr. Newberg has written several articles on her experiences as a woman scientist and the mother of four children. She is chairman of the Dudley Observatory board of trustees, and has participated in numerous public outreach and educational activities.

Abstract

Dwarf galaxies that come too near the Milky Way galaxy will be pulled apart by the Galaxy's tidal forces, spreading stars out into long "streams" that can stretch all the way around the Galaxy. In principle, these tidal streams can be used to constrain not only the total mass of the Milky Way, but also the overall distribution of mass (spherical, oblate, prolate, triaxial, and/or lumpy). We fit the spatial density of tidal streams in the halo of the Milky Way using a technique called statistical photometric parallax, using the computing power of tens of thousands of people around the world who volunteer their computing cycles to our problem. The volunteer computing server is called MilkyWay@home. We are also building an N-body simulator with MilkyWay@home that will match the distribution of stars in the tidal streams with the results of N-body simulations.

All are welcome! Tea, coffee, biscuits will be served at 2:15 P.M.