
Finding and characterizing the darkest galaxies around the Milky Way with the Pan-STARRS survey

Supervisors:

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How few stars can a galaxy have and still be a galaxy? The main goal of the thesis will be to use the Pan-STARRS survey to uncover the darkest satellite galaxies of the Milky Way and characterize them. These extreme systems may consist of only a few hundred stars residing at the centers of the most numerous dark-matter dark matter halos. Such tiny galaxies are extremely useful probes of the cosmology on the scales of galaxies and can also be used to test the tenets of galaxy formation. However, finding them is very challenging. The new Pan-STARRS survey, whose Milky-Way-related science is headed by Nicolas Martin and Hans-Walter Rix, is the widest and deepest of current surveys of the night-sky at optical/near-infrared wavelengths. It provides the best opportunity to find many new Milky Way satellites. The student's role will be to find the satellites, as clumps of stars at the same distance, in the huge photometric dataset and lead the analysis of their properties from both survey data and dedicated photometric/spectroscopic follow-up on the world's largest telescopes.

The prospective PhD student is expected to spend about 2/3 of their time in Strasbourg and about 1/3 of their time in Heidelberg. Starting date: any time in 2012.

References:

Belokurov et al. (2007), ApJ 654, 897, *Cats and Dogs, Hair and a Hero: A Quintet of New Milky Way Companions*.

Koposov S. et al. (2008), ApJ 686, 279, *The Luminosity function of the Milky Way satellites*.

Martin N. et al. (2006), MNRAS 371, 1983, *Discovery and analysis of three faint dwarf galaxies and a globular cluster in the outer halo of the Andromeda galaxy*.

Martin N., de Jong J. & Rix H.-W. (2008), ApJ 684, 1075, *A Comprehensive Maximum Likelihood Analysis of the Structural Properties of Faint Milky Way Satellites*.

Martin N. et al. (2009), ApJ 705, 758, *PAndAS' CUBS: Discovery of Two New Dwarf Galaxies in the Surroundings of the Andromeda and Triangulum Galaxies*.

Schlafly E. et al. (2012), ApJ submitted, arXiv:1201.2208, *Photometric Calibration of the First 1.5 Years of the Pan-STARRS1 Survey*.