The Impact of Large-Scale Surveys on Pulsating Star Research
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Impact of the Sloan Digital Sky Survey on Variable Star Research

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Abstract. We present the results of a preliminary search for variable objects in about 100 deg^2 of SDSS commissioning data surveyed twice with Δt=1.99462 days. In particular, we find that the density of RR Lyrae star candidates abruptly ends at a galactocentric radius of 50–60 kpc.

The Sloan Digital Sky Survey (SDSS) will be the first large-area photometric survey to utilize CCD detectors. Using a 2.5-m wide-field special-purpose telescope, it will produce a detailed digital photometric map in five colors of half the northern sky to about 23 mag. About 225 deg^2 in a long, thin stripe along celestial equator will be scanned about 45 times. These scans will be co-added to produce a single, about 2 magnitudes deeper image, and differences between scans will be used to identify variable objects. In addition, because of the overlaps in scans, about 40% of the total covered area (4000 deg^2) will be observed twice. Although two observations are hardly enough to characterize a variable object, with the help of 5-band photometric data SDSS is expected to vastly increase the known number of variable stars.

Here we present the results of a preliminary search for variable objects in about 100 deg^2 of sky surveyed twice with Δt=1.99462 d. About 0.05% of the point sources show significant variation: most of these are either flare stars or variable objects with A-star colors and thus probably dominated by RR Lyrae stars. Assuming the latter to be true, we derive the volume density of RR Lyrae stars from the observed mean r' magnitude distribution. Our results show two important differences when compared to previous work: the density of RR Lyrae stars follows a much shallower power law (2.3 ± 0.2) than conventional power law r^{-3}, and it abruptly ends at a galactocentric radius of 50–60 kpc. While these results are based on a preliminary search of a small area and are sensitive to contamination by variable stars other than RR Lyrae stars, they can be easily verified when the light curves for all candidates become available.

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