

An AO-assisted variability study of four globular clusters

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Abstract

The image-subtraction technique applied to study variable stars in globular clusters represented a leap in the number of new detections, with the drawback that many of these new light curves could not be transformed to magnitudes due to severe crowding. In this paper, we present observations of four Galactic globular clusters, M 2 (NGC 7089), M 10 (NGC 6254), M 80 (NGC 6093), and NGC 1261, taken with the ground-layer adaptive optics module at the SOAR Telescope, SAM. We show that the higher image quality provided by SAM allows for the calibration of the light curves of the great majority of the variables near the cores of these clusters as well as the detection of new variables, even in clusters where image-subtraction searches were already conducted. We report the discovery of 15 new variables in M 2 (12 RR Lyrae stars and 3 SX Phe stars), 12 new variables in M 10 (11 SX Phe and 1 long-period variable), and 1 new W UMa-type variable in NGC 1261. No new detections are found in M 80, but previous uncertain detections are confirmed and the corresponding light curves are calibrated into magnitudes. Additionally, based on the number of detected variables and new Hubble Space Telescope/UVIS photometry, we revisit a previous suggestion that M 80 may be the globular cluster with the richest population of blue stragglers in our Galaxy..

Keywords

Globular clusters: individual (M2 = NGC 7089, M10 = NGC 6254, M80 = NGC 6093, NGC 1261), Stars: variables: delta Scuti, Stars: variables: RR Lyrae.