

RELIABLE STANDARDS FOR POLARIMETRY: TECHNIQUE, CALIBRATION AND VARIABILITY

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Polarization is an important property of light. It is the subject of observation, interpretation and simulation for multiple decades. Correct polarimetric data processing require high polarization standards and zero-polarization stars.

The observations were obtained using single-channel aperture photometer-polarimeter on the 2.6-m Shajn mirror telescope (SMT) at the Crimean astrophysical observatory (Ukraine) in 2002 - 2017. Measurements of zero-polarization stars are used to compute the instrumental polarization. Classic approach implies usage of the measurements obtained each night before and or after the observations, in the same filter, similarly to flat field and dark frames in CCD photometry. We determined the instrumental polarization in the form of piecewise continuous functions from the observations of about 65 non-polarized stars for the whole data interval. Highly polarization standards were observed for calibration of position angle zero-point. taking into account statistically insignificant difference between many consecutive sets, we decided to determine the position angle for time intervals larger then one set of observations. We obtained the catalogue of Stokes parameters for 98 standard stars (both non-polarized and highly polarized). Our catalogue is not compilative, but obtained using the same instrument and technique. We analyzed time series of Stokes parameters of each standard using multiple well known scatter-based numerical parameters characterizing the degree of variability (so called variability indices). We detected some standard stars to show variability of at least one Stokes parameter, so they should not be used as polarized standard stars without further investigation.

The technique we used allows to increase the reliability of results, since incorrect accounting of even one standard may have significant impact on the results of polarimetric observations.