



Investigation of the errors in SDSS proper-motion measurements using samples of quasars

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We investigate in detail the probability distribution function (pdf) of the proper-motion measurement errors in the SDSS+USNO-B proper-motion catalog of $\mu_{\text{gal}}^{\text{SDSS}}$ using clean quasar samples. The pdf of the errors is well-represented by a Gaussian core with extended wings, plus a very small fraction ($<0.1\%$) of "outliers". We find while formally the pdf could be well-fit by a five-parameter fitting function, for many purposes it is also adequately to represent the pdf with a one-parameter approximation to this function. We apply this pdf to the calculation of the confidence intervals on the true proper motion for a SDSS+USNO-B proper motion measurement, and discuss several scientific applications of the SDSS proper motion catalogue. Our results have various applications in studies of the galactic structure and stellar kinematics. Specifically, they are crucial for searching hyper-velocity stars in the Galaxy.

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