

# Completeness III: identifying characteristic systematics and evolution in galaxy redshift surveys

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This paper continues our development of non-parametric tests for analysing the completeness in apparent magnitude of magnitude-redshift surveys. The purpose of this third and final paper in our completeness series is two-fold: firstly we explore how certain forms of incompleteness for a given flux-limited galaxy redshift survey would manifest themselves in the ROBUST  $T_c$  and  $T_v$  completeness estimators introduced in our earlier papers; secondly we provide a comprehensive error propagation for these estimators. By using both real surveys and Monte Carlo mock survey data, we have found distinct, characteristic behaviour of the  $T_c$  and  $T_v$  estimators which identify incompleteness in the form of e.g. missing objects within a particular magnitude range. Conversely we have identified signatures of 'over' completeness, in cases where a survey contains a small region in apparent magnitude that may have too many objects relative to the rest of the data set. We also demonstrate how incompleteness resulting from luminosity evolution can be identified and provide a framework for using our estimators as a robust tool for constraining models of luminosity evolution.

Finally we explore the error propagation for  $T_c$  and  $T_v$ . This builds on Completeness II by allowing the definition of these estimators, and their errors, via an adaptive procedure that accounts for the effects of sampling error on the observed distribution of apparent magnitude and redshift in a survey.

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