

# GUNDAM: Blazing Fast Spatial Correlation Functions in Galaxy Surveys

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**Abstract** / We describe the capabilities of a new software package to calculate two-point correlation functions (2PCFs) of large galaxy samples. The code can efficiently estimate 3D/projected/angular 2PCFs with a variety of statistical estimators and bootstrap errors, and is intended to provide a complete framework (including calculation, storage, manipulation, and plotting) to perform this type of spatial analysis with large redshift surveys.

GUNDAM is a mixed Python-Fortran code that implements a very fast skip list/linked list algorithm to efficiently count galaxy pairs and avoid the computation of unnecessary distances. It is several orders of magnitude faster than a naive pair counter, and matches or even surpass other advanced algorithms. The implementation is also embarrassingly parallel, making full use of multicore processors or large computational clusters when available.

The software is designed to be flexible, user friendly and easily extensible, integrating optimized, well-tested packages already available in the astronomy community. Out of the box, it already provides advanced features such as custom weighting schemes, fibre collision corrections and 2D correlations. GUNDAM will ultimately provide an efficient toolkit to analyse the large-scale structure ‘buried’ in extremely large data sets generated by future surveys or by iterative Monte-Carlo schemes built around simulations.

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