

## Evaluating bulk flow estimators for CosmicFlows-4 measurements

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For over a decade there have been contradictory claims in the literature regarding measurements of local bulk flow motions of galaxies, as to whether measurements are consistent or in tension with the currently accepted model of cosmology, Lambda-CDM. A bulk flow measurement can be thought of as an average of galaxy motions sourced by gravity in a volume of space. The robustness of various popular bulk flow estimators have not previously been investigated. In this talk I will discuss the research I have done to investigate the accuracy and precision of a few bulk flow estimators with simulations. I also present a bulk flow measurement using the largest catalogue of peculiar velocities to date, which is consistent with the direction of previous bulk flow measurements but has a larger amplitude than predicted by Lambda-CDM. The bulk flow indicates a strong pull in the negative super-galactic 'x' which lies out of sight, behind the plane of the Milky Way.

**Author:** WHITFORD, Abbe

**Presenter:** WHITFORD, Abbe

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