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Cosmic Flows and the Structure of the Local Universe

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The Local Volume is the area of the cosmos we can analyze in most detail with respect to the properties of its galaxy population, their abundance, their inner structure, their distribution, and their formation. Indeed, many challenges of the cosmological concordance model such as the substructure crisis or the surprising occurrence of vast planes of satellite galaxies are intimately linked to observations of the local galaxy population. However, owing to the peculiar environment of our Milky Way system and its cosmic neighborhood, the Local Volume may also be severely biased. Cosmography, i.e. the reconstruction of the local cosmic web from cosmic flows, and constrained simulations of structure formation as a tool to produce simulated local group analogues provide a powerful method to analyze and quantify these biases. Possible applications include the analysis of the local distribution of dwarf galaxies around luminous galaxies and the characterization of the mass accretion history of these objects. Thanks to the extension of galaxy velocity data out to distances in excess of 200Mpc, we are now capable to reconstruct the 3D matter distribution out to these distances, thus constraining the formation history of object such as the Virgo Cluster.