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# MAGIC

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## Science of the Cosmos

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### **Towards a Standardized Methodology for Cosmic Void Analysis**

Cosmic voids are regions of the Universe that contain very few galaxies in their interiors, forming large expanses of relatively empty space. The study of these structures allows an understanding of the formation and dynamics of the Cosmic Web, making inferences about global cosmology, testing theories of galaxy formation and evolution, and testing modified gravity models. There are various algorithms for identifying cosmic voids in the literature. Some are based on the identification of voids as low-density regions using galaxies as tracers. Although there are a large number of studies carried out on cosmological voids, in general each study uses its own identification method and its own parameters, making comparison very difficult. Although there have been initiatives to carry out a comparison, there is still no tool that allows the comparison of the results of various methods in a direct way. This work presents a novel framework that integrates multiple public algorithms to characterize voids and represent them in a common, comparable format, regardless of their geometry. The framework provides a unified interface that determines whether a tracer belongs to a void as defined by a selected algorithm, enabling more direct comparisons of results across different methods. This approach aims to standardize void characterization, facilitating more robust and consistent analyses in the field of cosmology and astrophysics.

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