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Dark Matter and the Cosmic Web variance

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The study and hunt for Dark Matter relies heavily on a proper modelling of the so-called astrophysical (or cosmological) factors. Local density of the prospective DM candidate in the solar vicinity or in the Galactic neighborhood, as well as the distribution of shapes, masses and abundance of the gravitational collapse DM haloes are quantities that are predictions of the the standard cosmological model. These need to be estimated adequately in order to obtain precise and unbiased estimations for DM observables. This is relevant and important for both direct (i.e. Earth-based laboratory) as well as indirect (i.e. astrophysical) DM searches. In my talk I will present new results stemming from advanced morphological analysis of the large-scale structure in cosmological simulations. These morphological aspects raveled a surprisingly strong impact of the so-called Cosmic Web environment (usually segmented into nodes, filaments, walls and voids) on various DM haloes and subhaloes properties. Our analysis reveals new results indicating that the commonly adopted assumption of DM halo self-similarity mighty be holding approximately. Mapping the Cosmic Web effects on DM observables can yield differences from 10 to even 100% from the previously adopted baseline.I will offer some preliminary and tentative discussion on the potential impact of our new findings for the DM search.

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