

Abstract Submitted  
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**Topology and geometry of the dark matter web**<sup>1</sup> NESAR RAMACHANDRA, SERGEI SHANDARIN, Univ of Kansas — Topological connections in the single-streaming voids and multi-streaming filaments and walls reveal a cosmic web structure different from traditional mass density fields. A single void structure not only percolates the multi-stream field in all the directions, but also occupies over 99 per cent of all the single-streaming regions. Sub-grid analyses on scales smaller than simulation resolution reveal tiny pockets of voids that are isolated by membranes of the structure. For the multi-streaming excursion sets, the percolating structure is much thinner than the filaments in over-density excursion approach. We also introduce, for the first time, a framework to detect dark matter haloes in multi-stream fields. Closed compact regions hosting local maxima of the multi-stream field are detected using local geometrical conditions and properties of the Lagrangian sub-manifold. All the halo particles are guaranteed to be completely outside void regions of the Universe. Majority of the halo candidates are embedded in the largest structure that percolates the entire volume.

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