

## Turnaround size of non-spherical structures

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The turnaround radius of a large structure in an accelerating universe has been studied only for spherical structures, while real astronomical systems deviate from spherical symmetry. We show that, for small deviations from spherical symmetry, the gauge-invariant characterization of the turnaround size using the Hawking-Hayward quasi-local mass and spherical symmetry still applies, to first order in the cosmological perturbation potentials and in the deviations from sphericity. This is the first step to include non-spherical systems in the physics of turnaround.

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