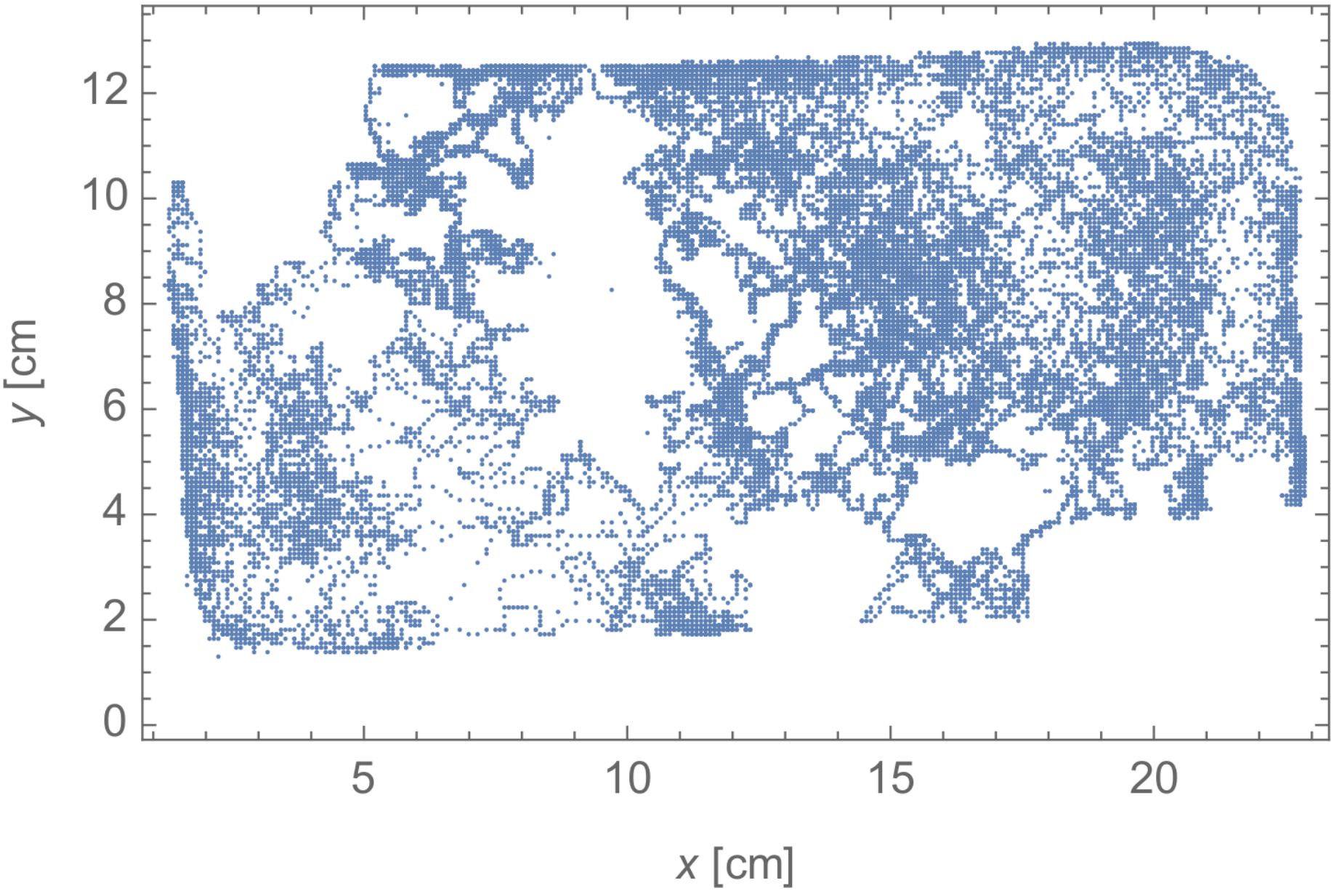
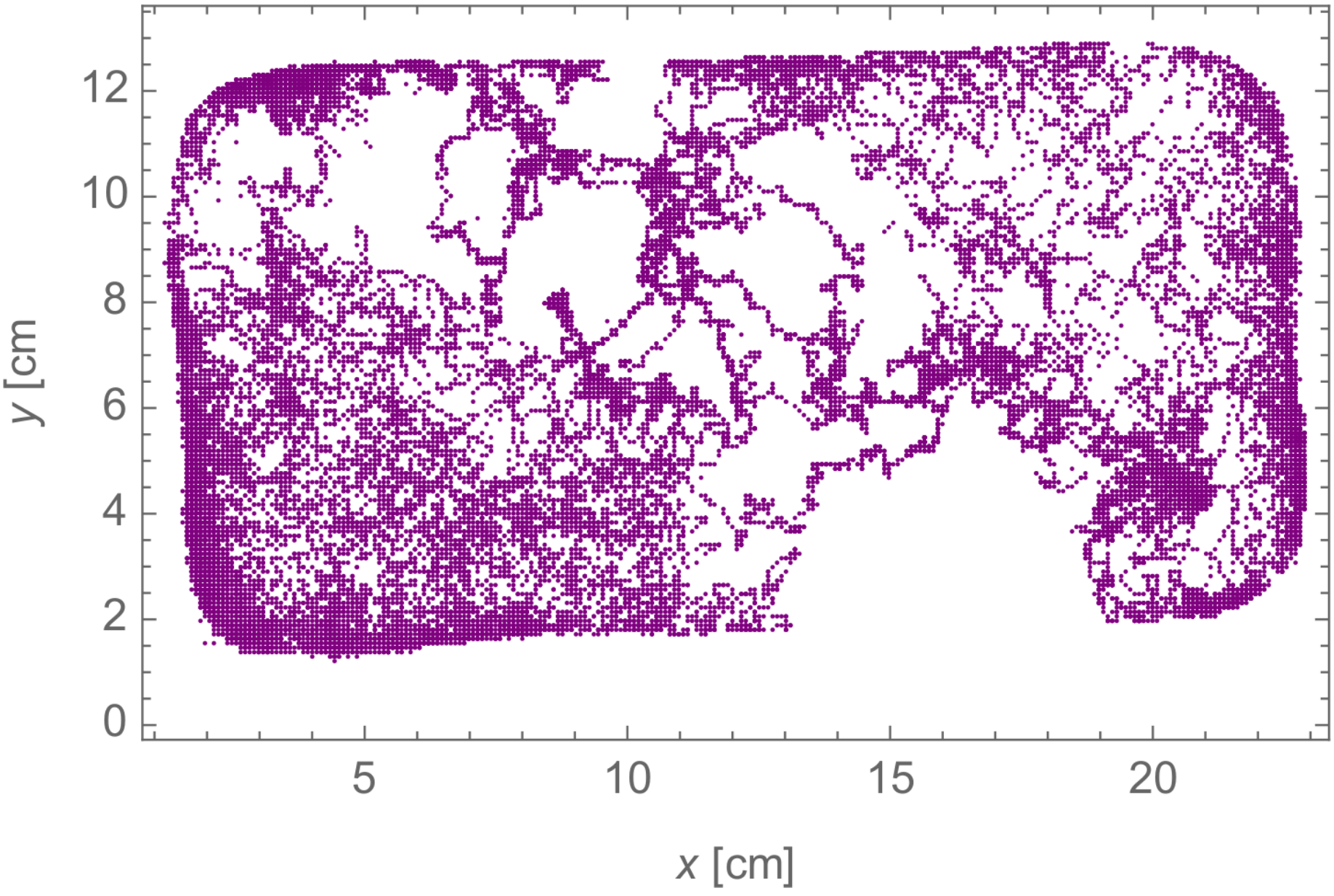
Shake, rattle, and roll...

Movie on course website: diff_fast2.mp4

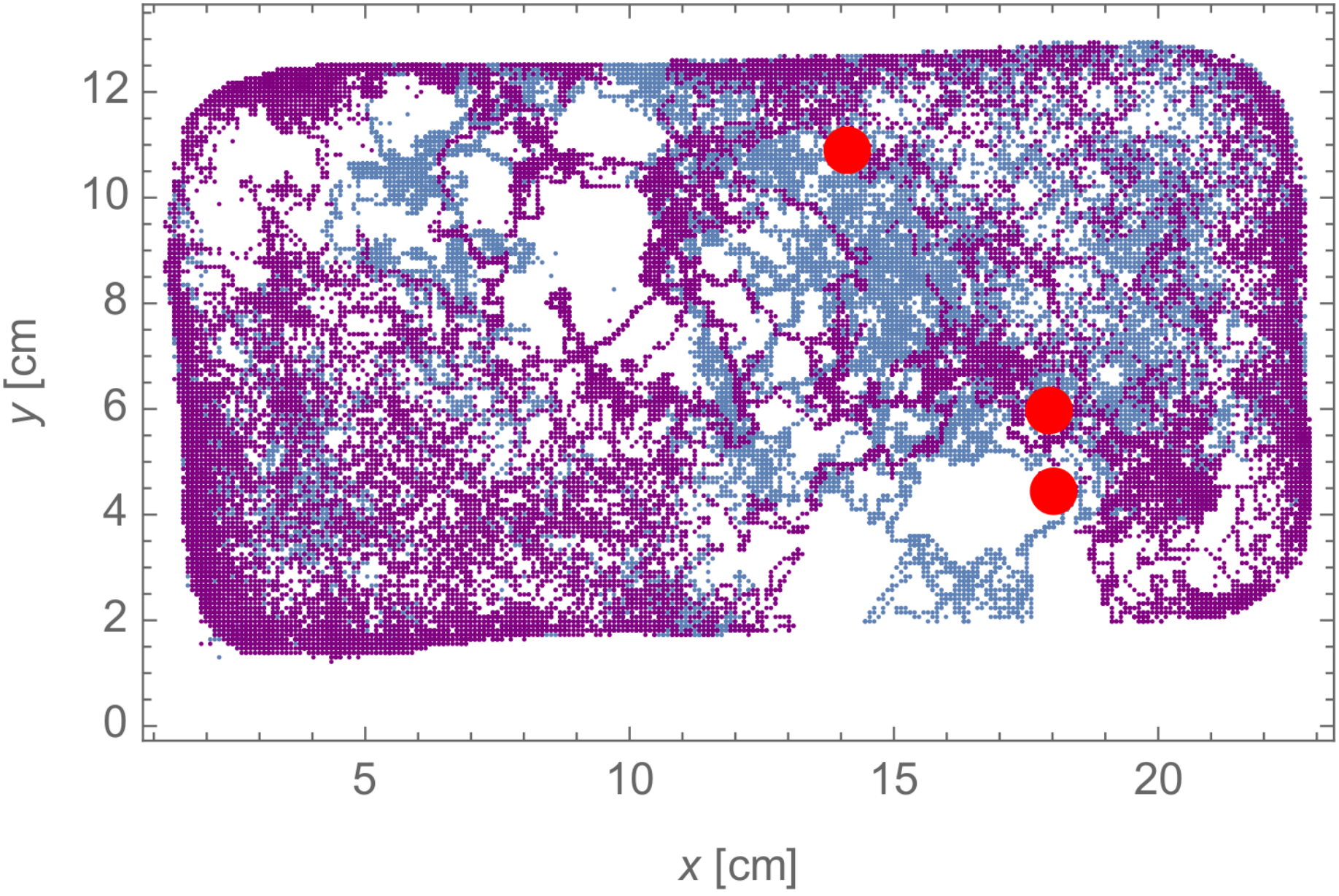
Particle tracks



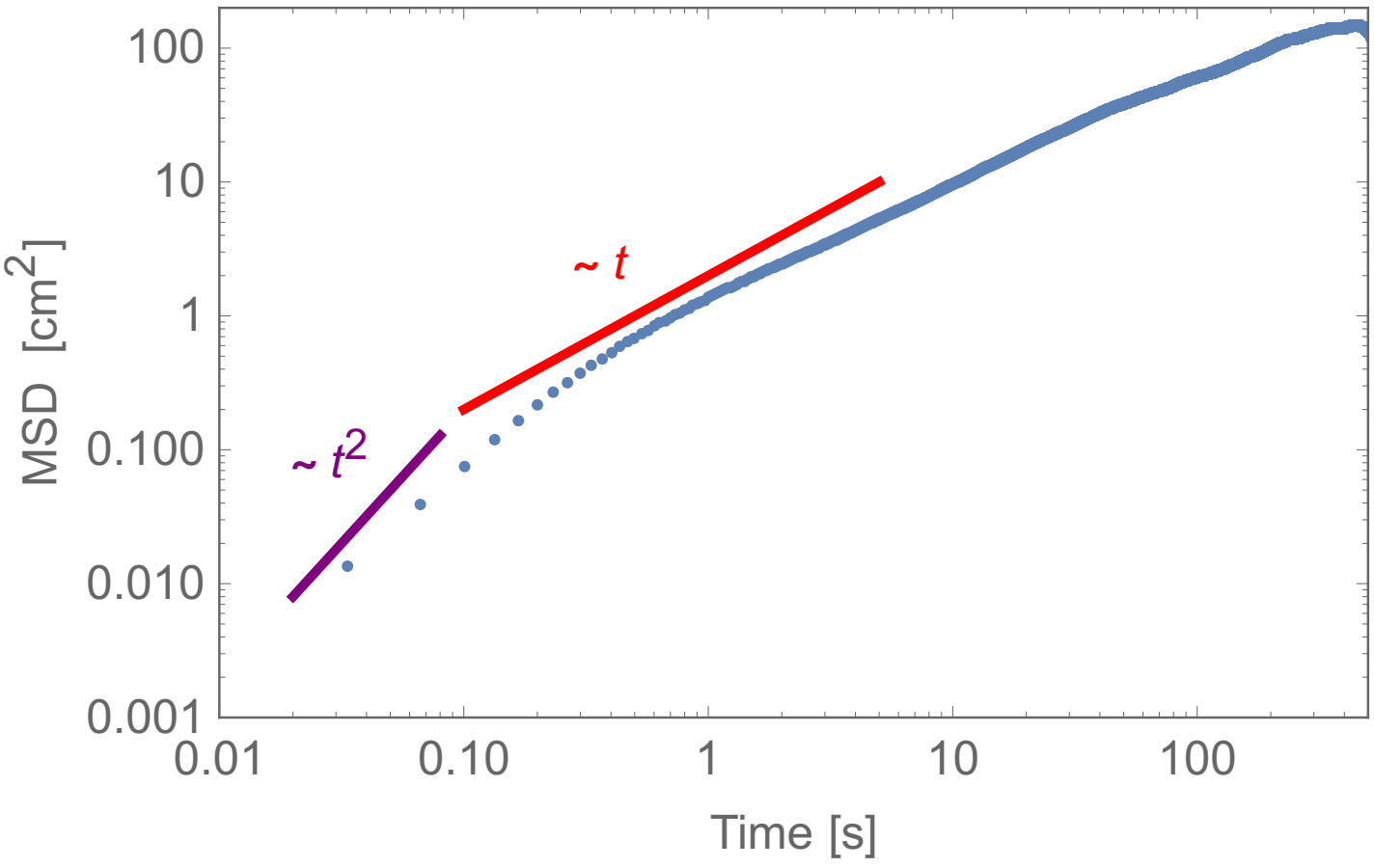
Particle tracks



Particle tracks



MSD



Caging dynamics

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Caging Dynamics in a Granular Fluid

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We report an experimental investigation of the caging motion in a uniformly heated granular fluid for a wide range of filling fractions, ϕ. At low ϕ the classic diffusive behavior of a fluid is observed. However, as ϕ is increased, temporary cages develop and particles become increasingly trapped by their neighbors. We statistically analyze particle trajectories and observe a number of robust features typically associated with dense molecular liquids and colloids. Even though our monodisperse and quasi-2D system is known to not exhibit a glass transition, we still observe many of the precursors usually associated with glassy dynamics. We speculate that this is due to a process of structural arrest provided, in our case, by the presence of crystallization.

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Caging dynamics