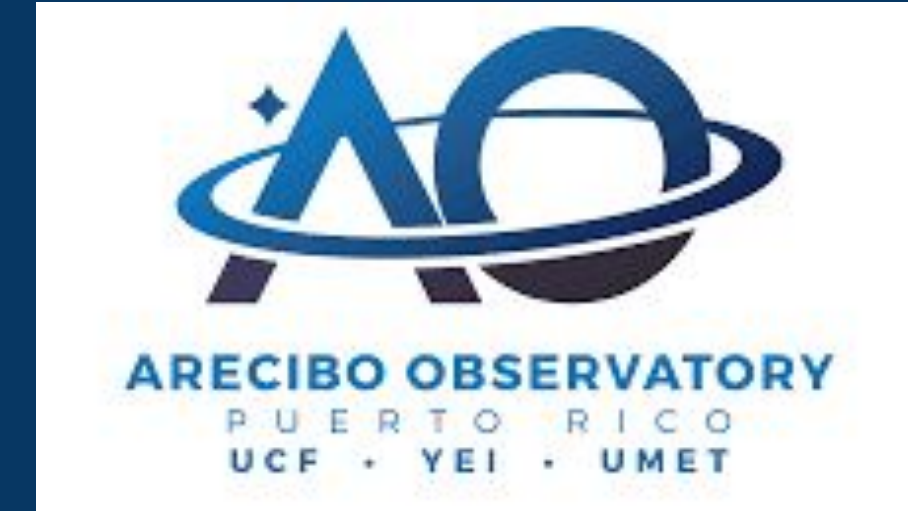# INCORPORATING A GRAVITY FIELD MODEL BASED ON RADAR OBSERVATIONS INTO THE REBOUND EJECTA DYNAMICS PACKAGE

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[1]University of Central Florida, [2]Arecibo Observatory, [3]SETI Institute
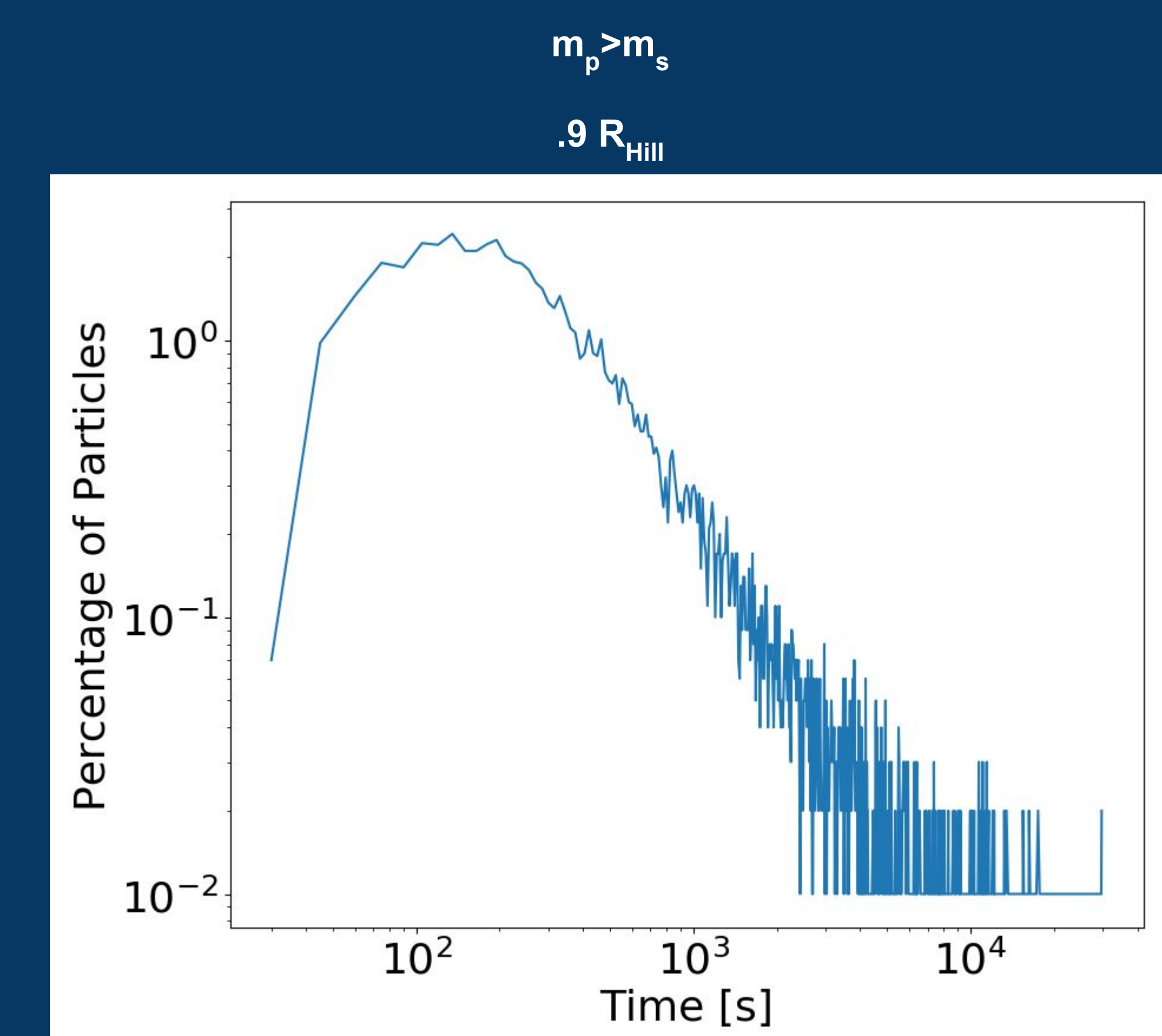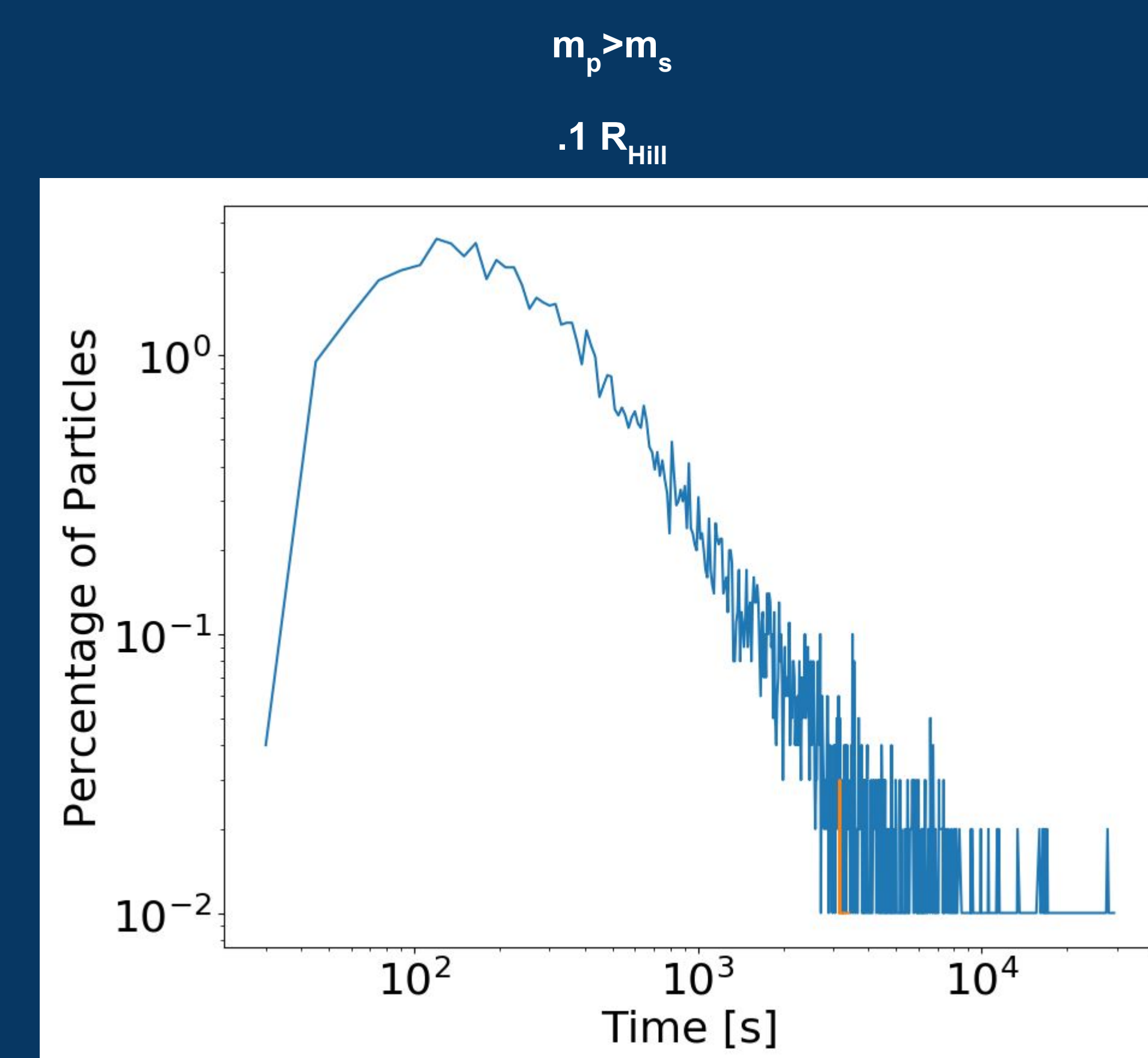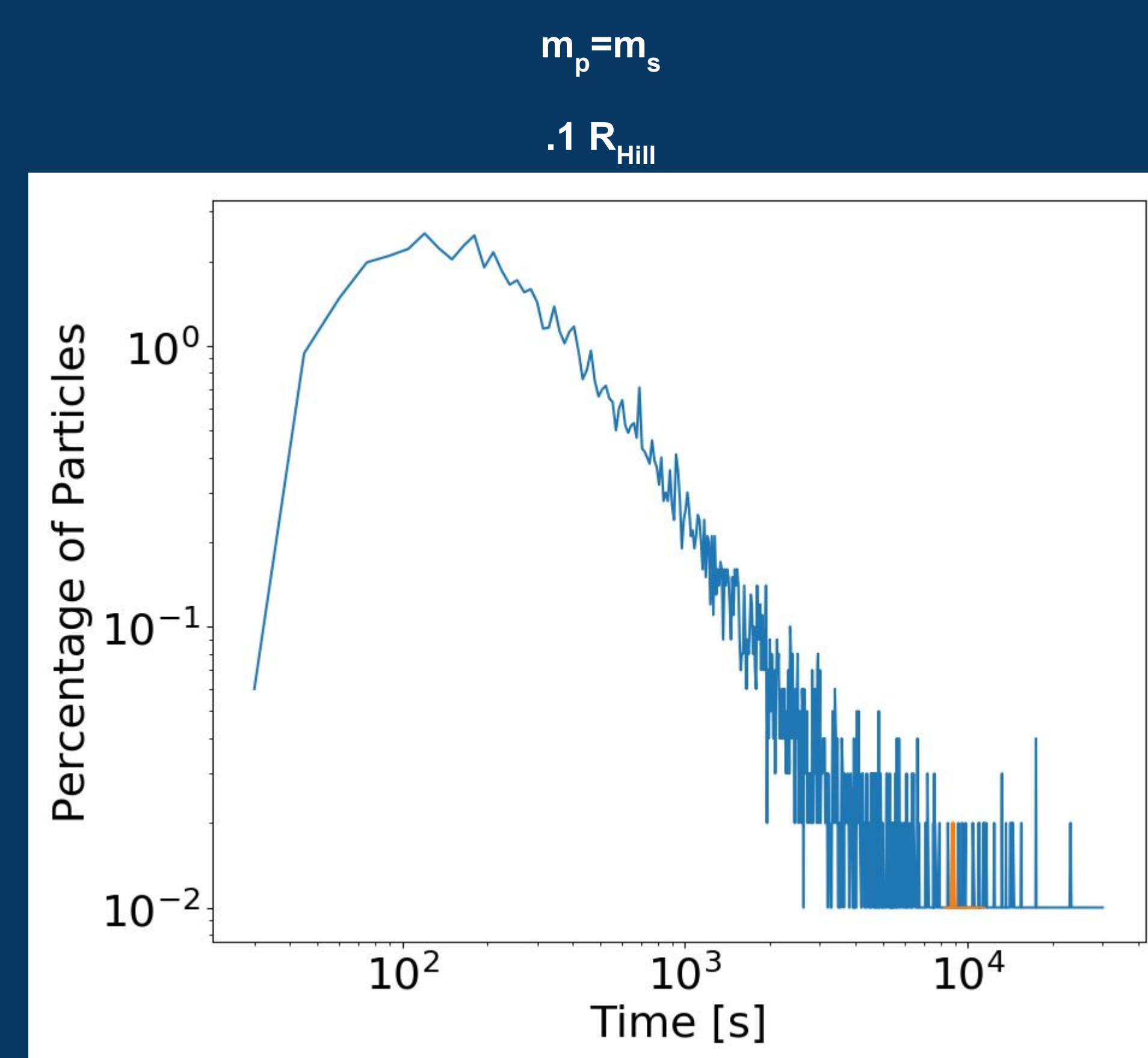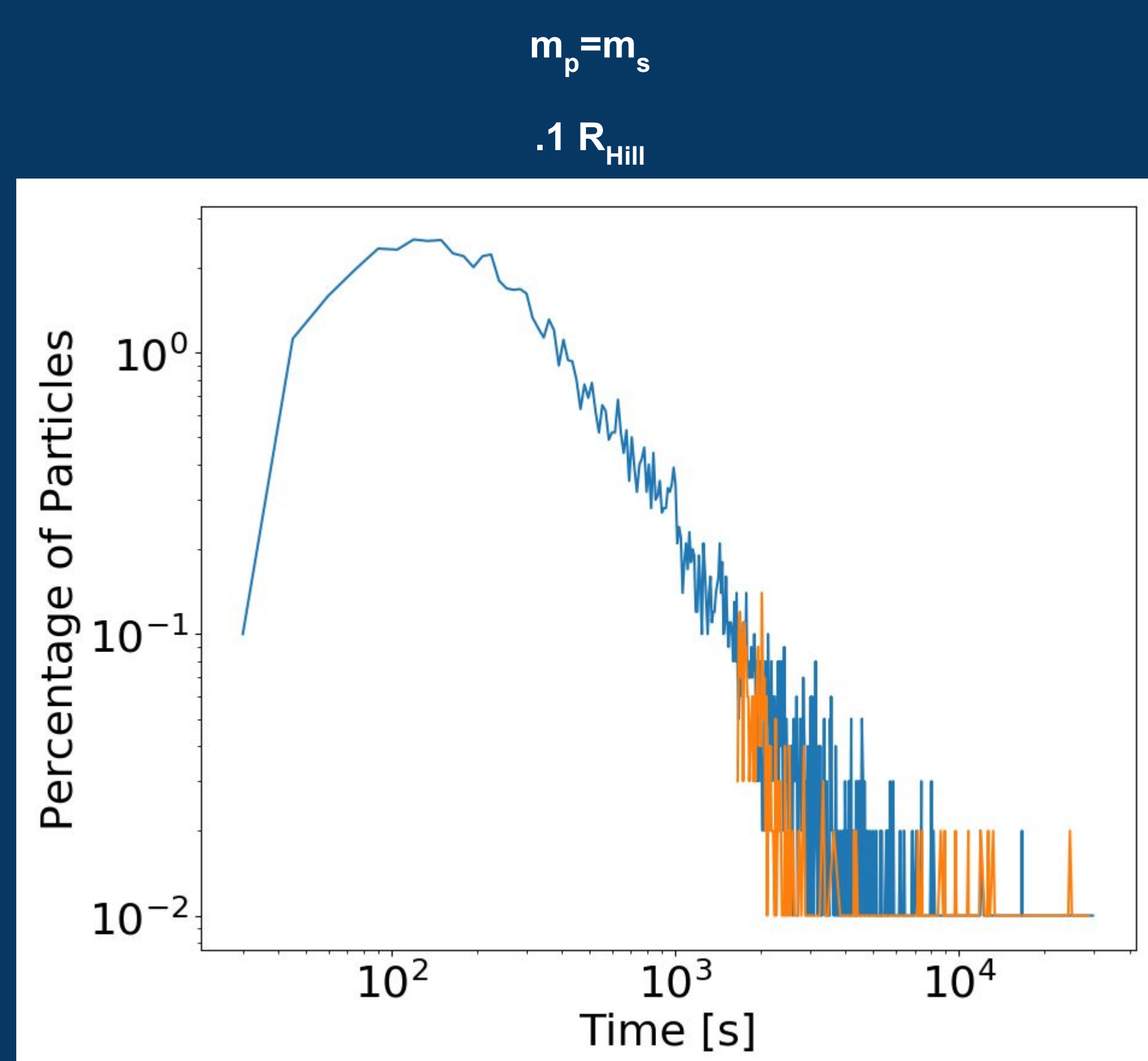
Objective: To demonstrate the functionality influence of the mascon-layer gravity field function in the *Rebound* Ejecta Dynamics (RED) package against variations on the Didymos system
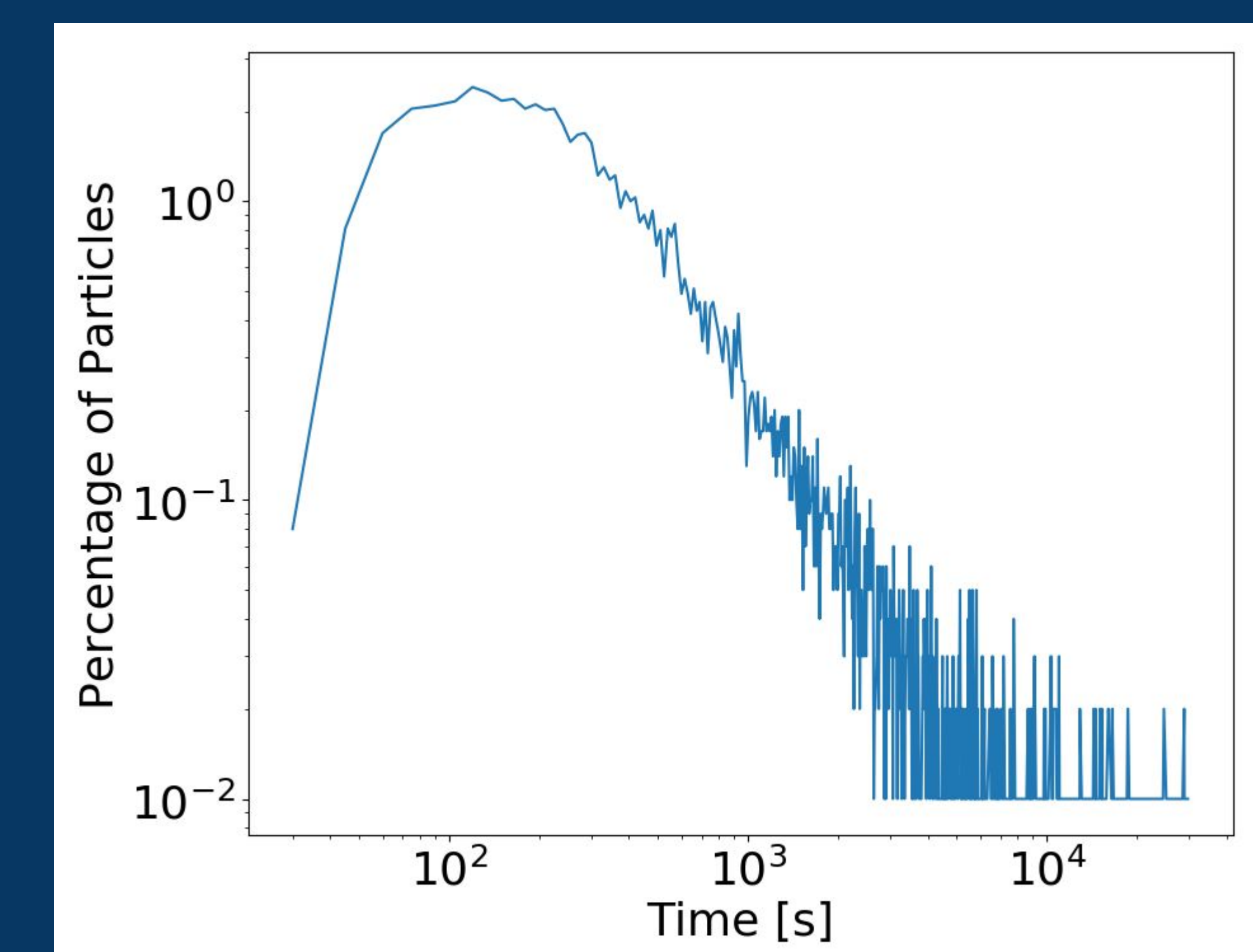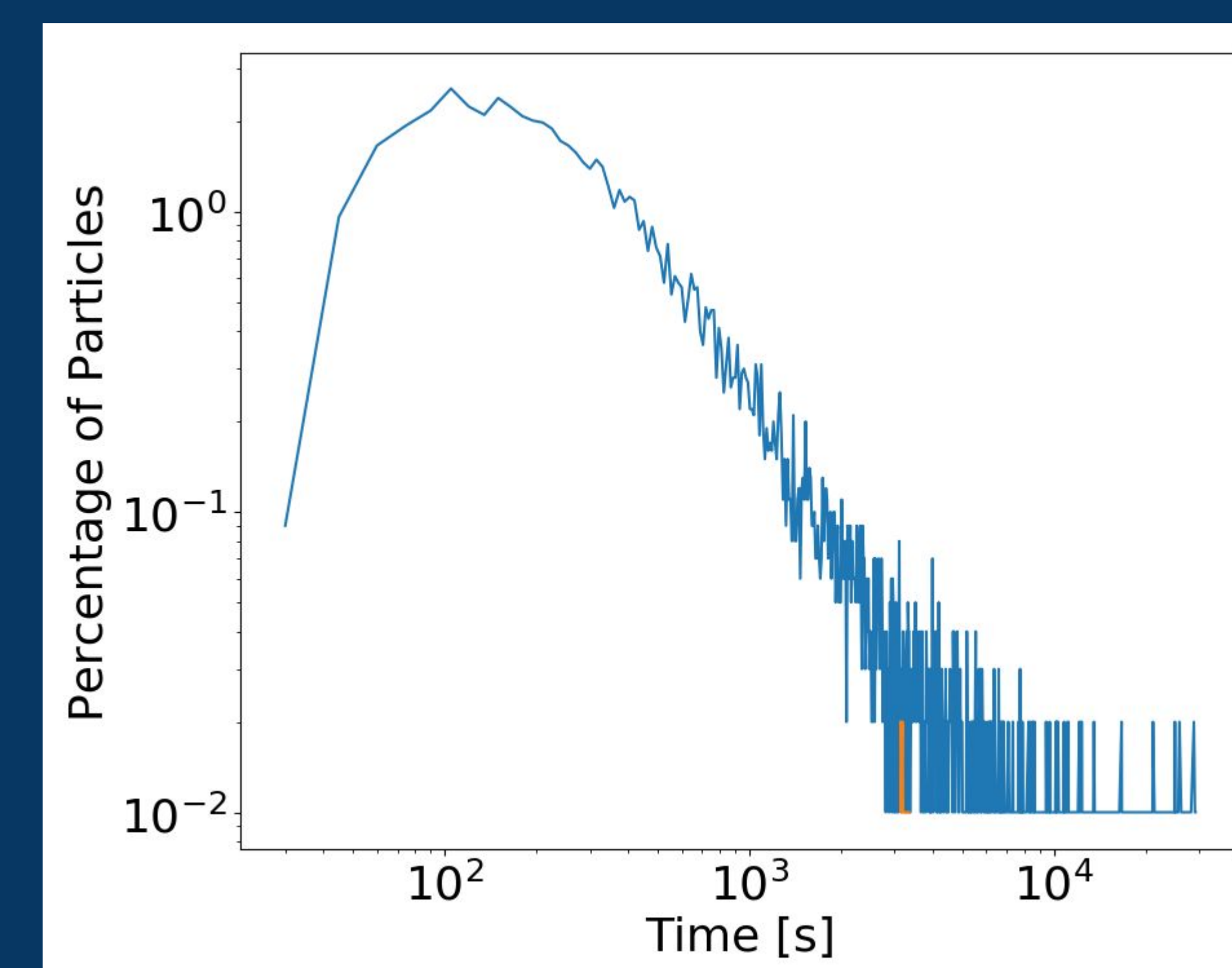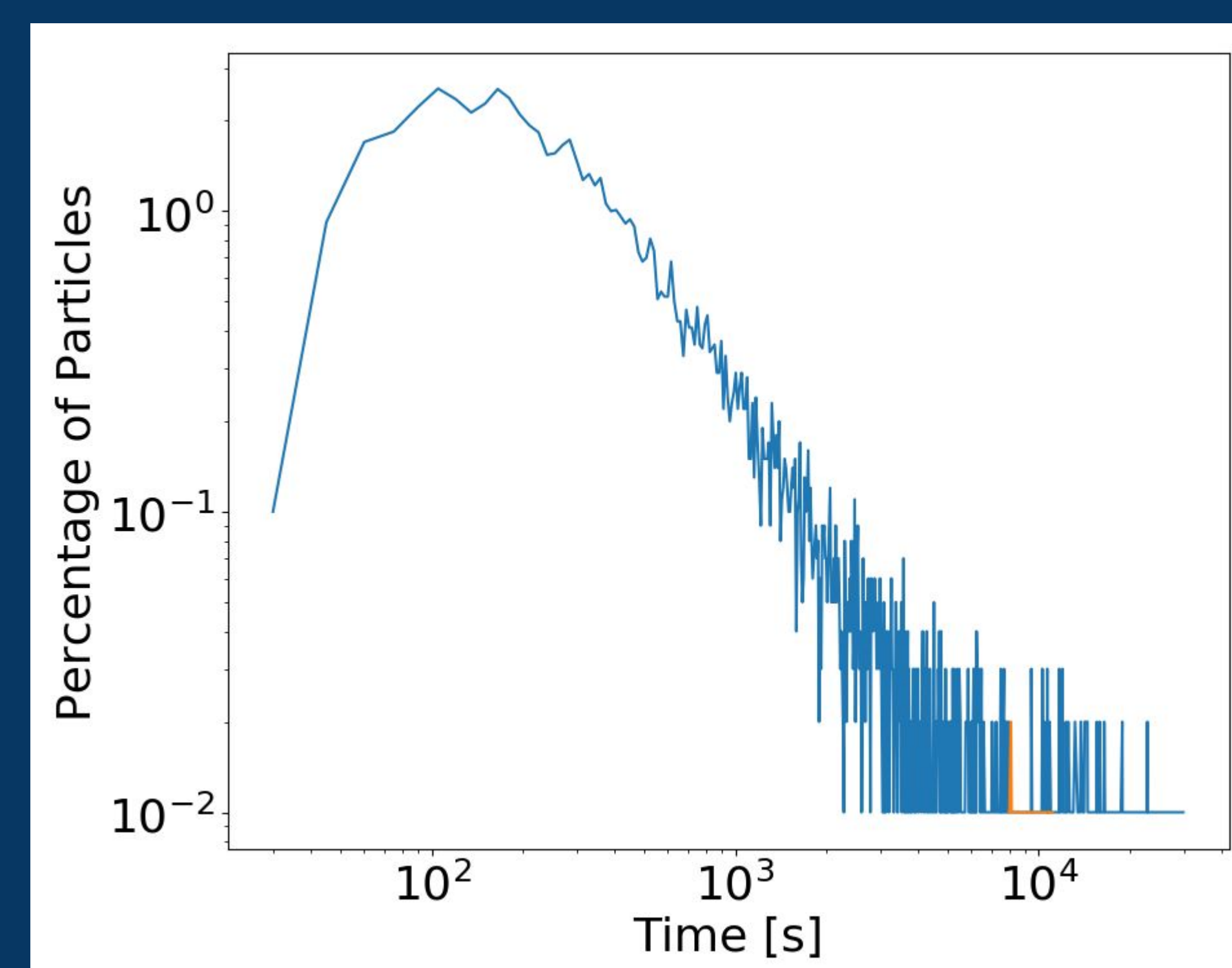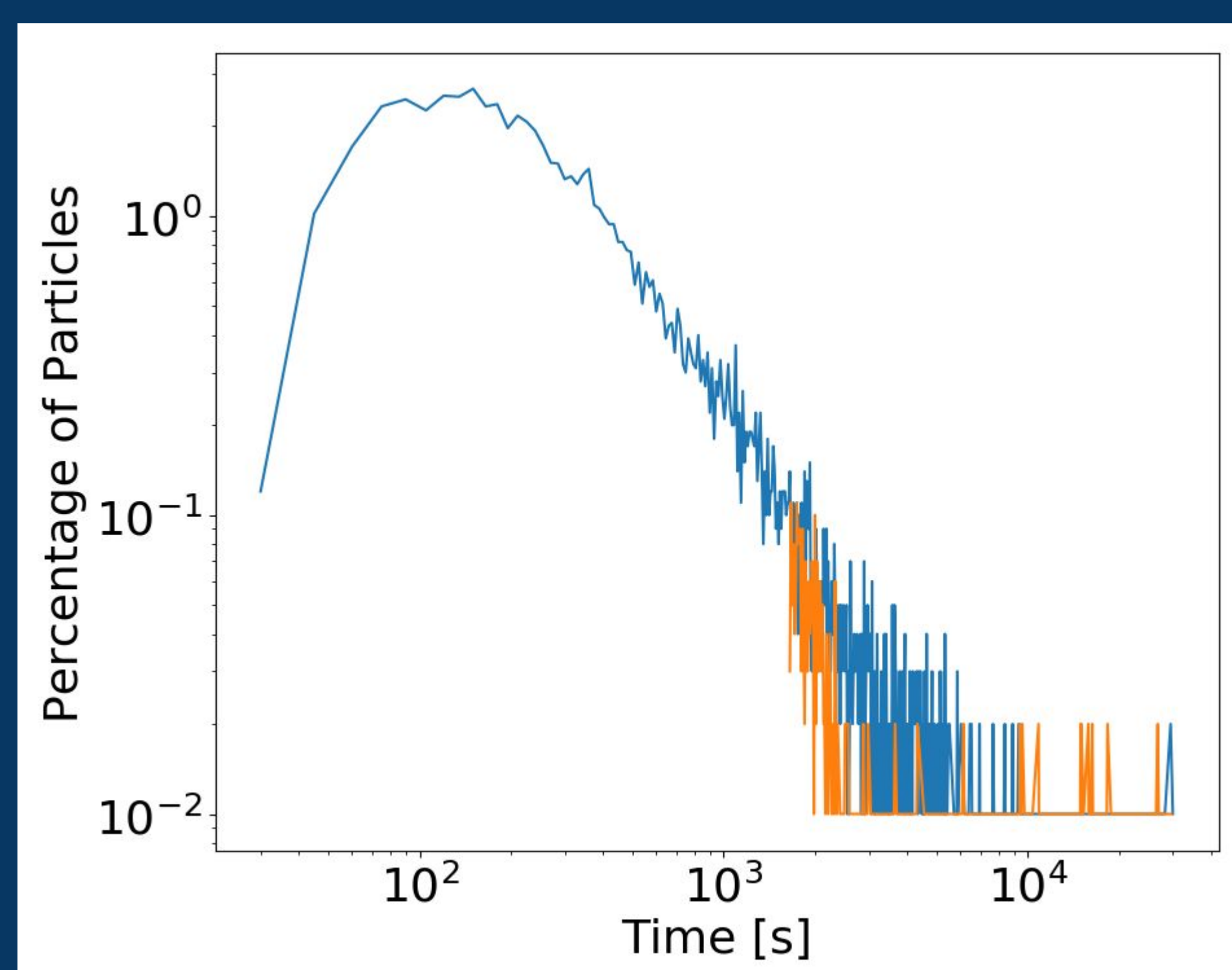
Variations:

Each simulation combines a variation on shape, mass and separation between primary and secondary bodies. The variations mean we do not create an exact replica of an impact in the Didymos system, rather we explore variations that demonstrate the influence of irregular surface features on impact ejecta.

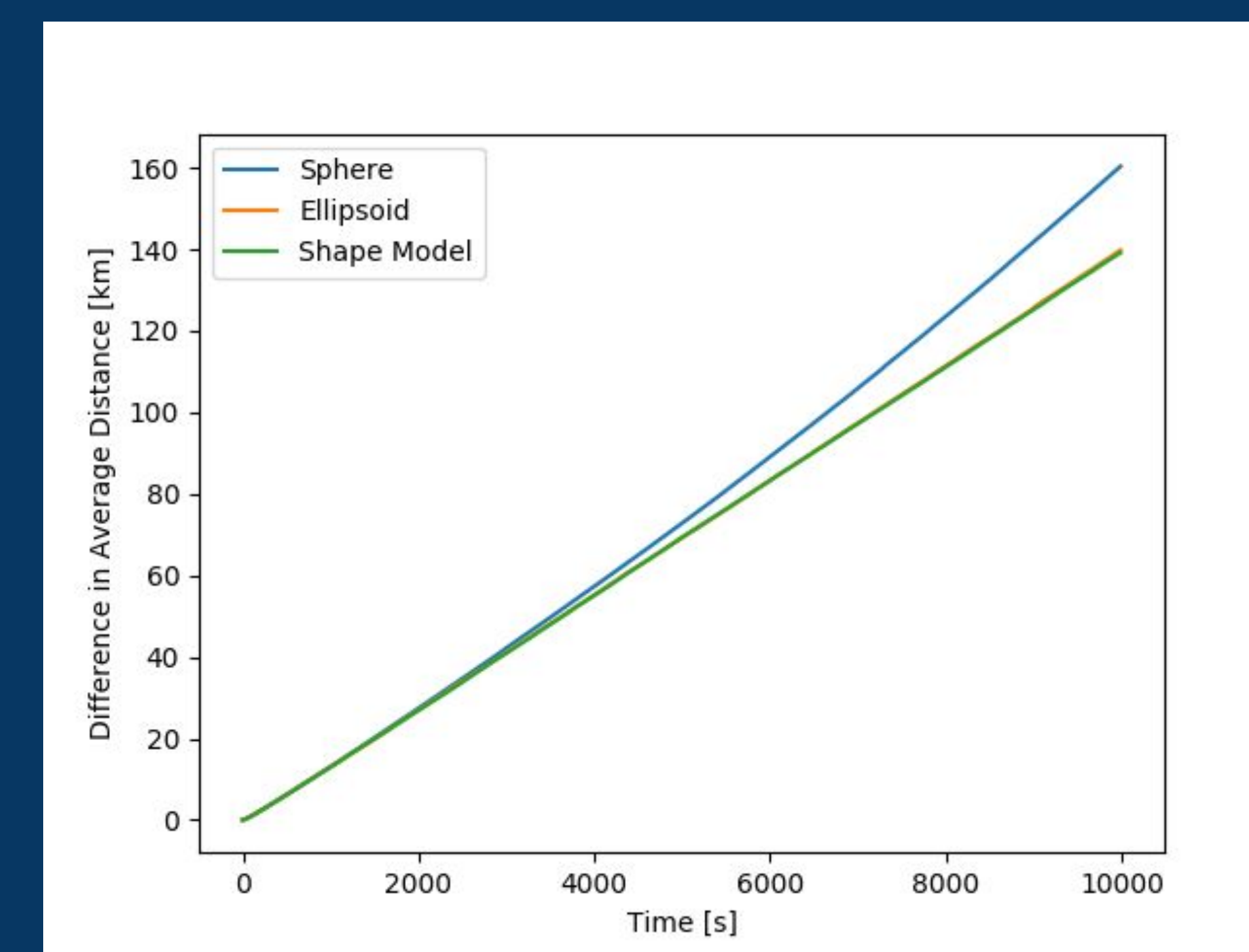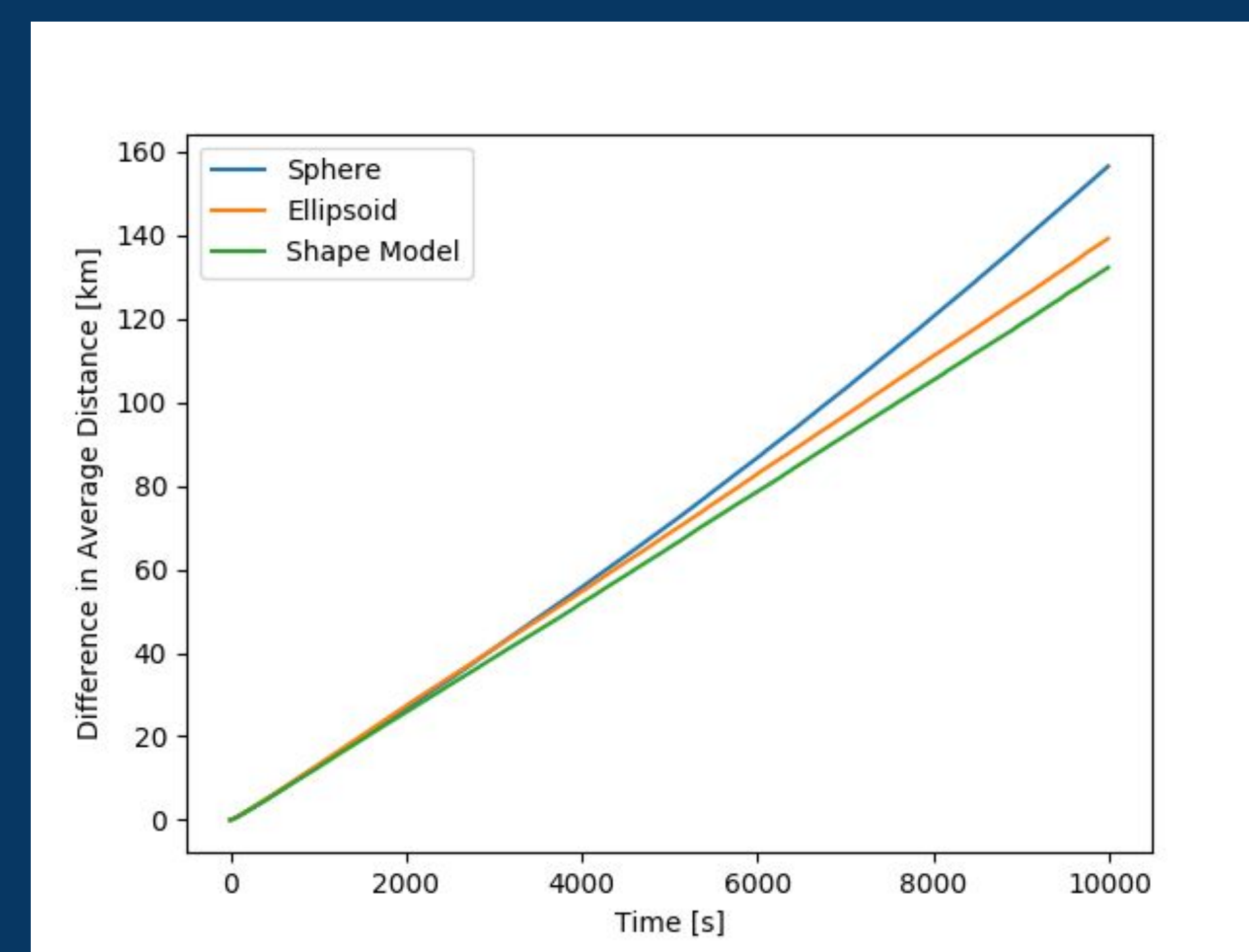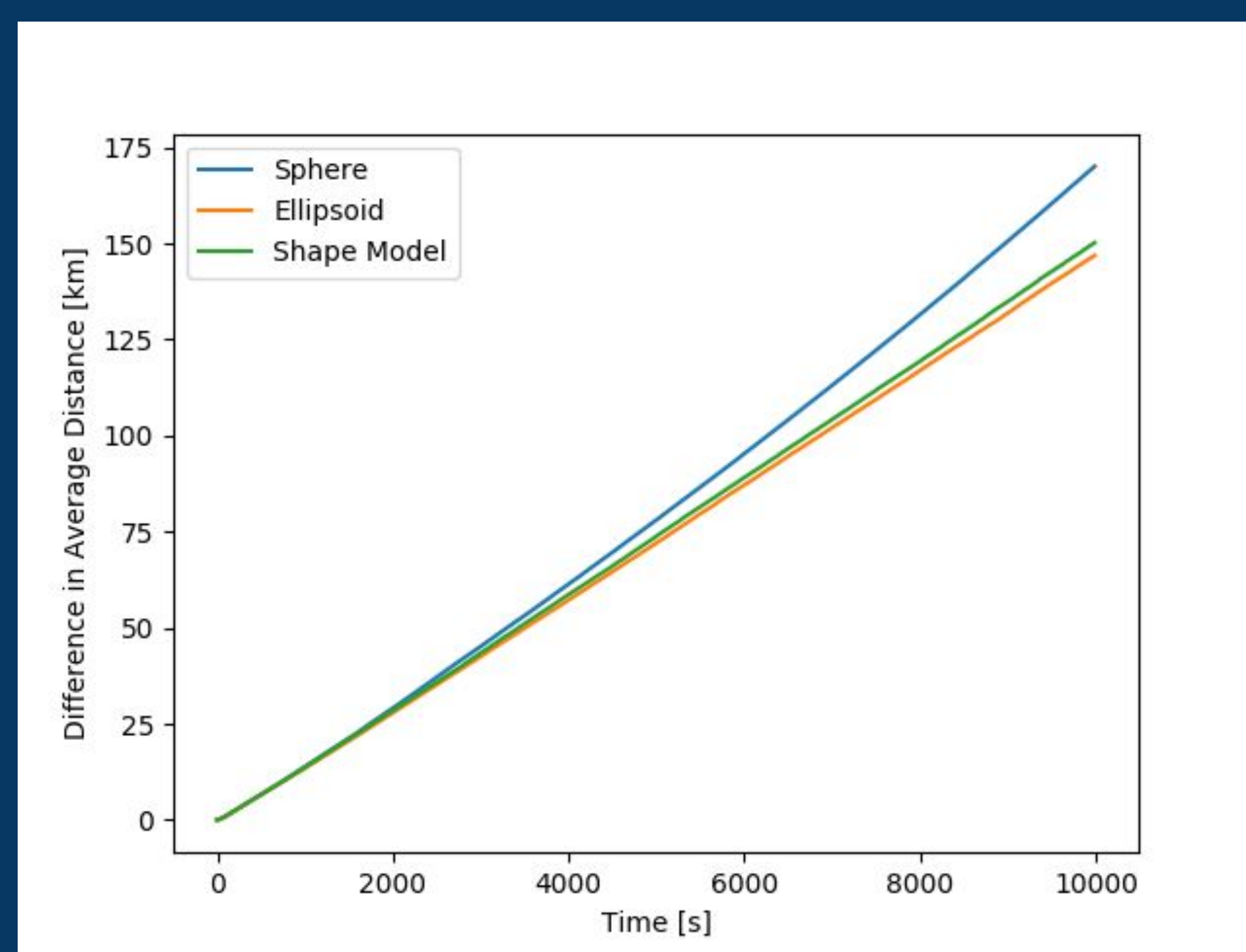| Shape	Mass	Separation
Sphere	$m_p = m_s$	.9 R_{Hill}
a>b>c	$m_p > m_s$	.1 R_{Hill}
Shape Model		
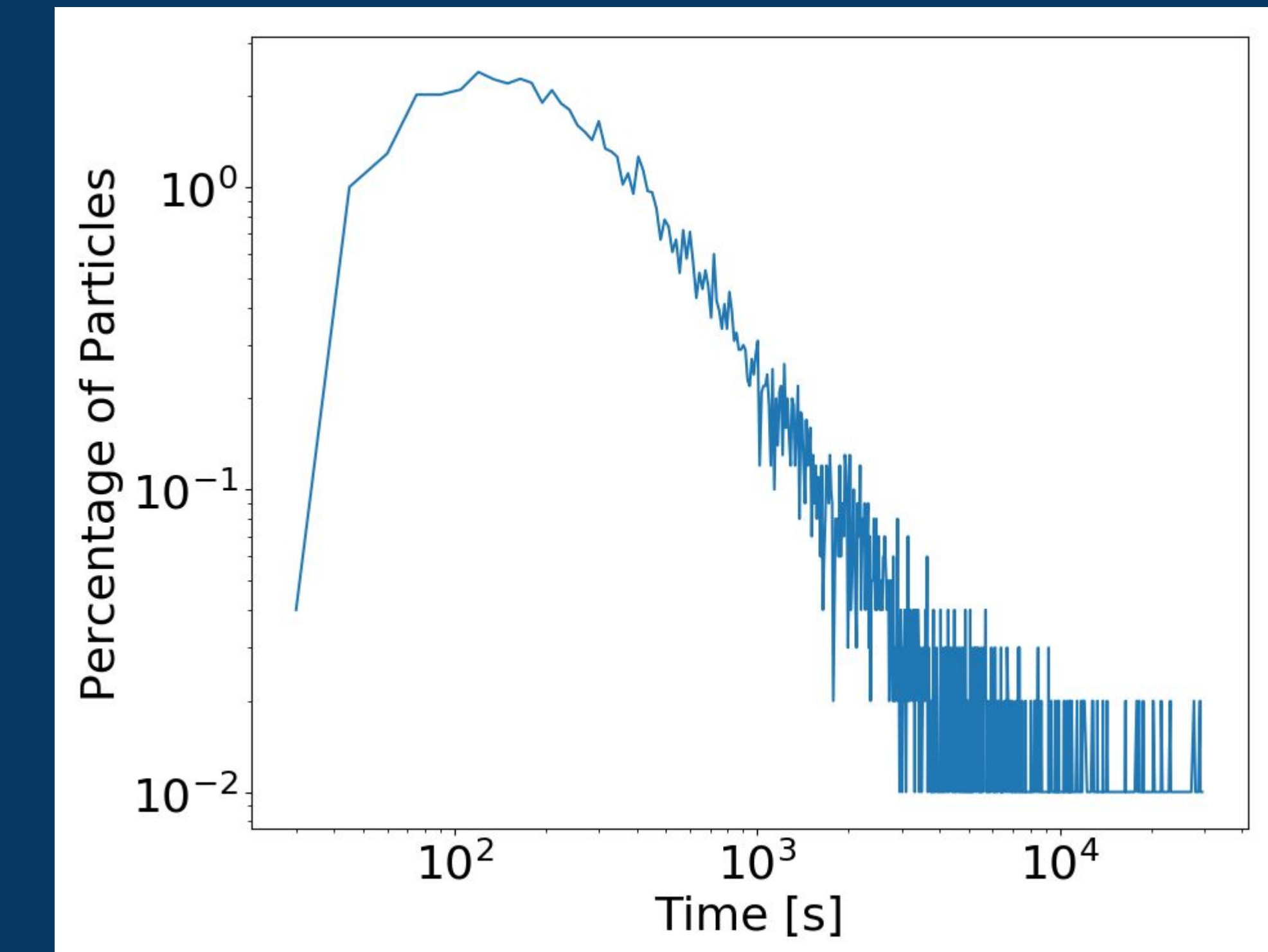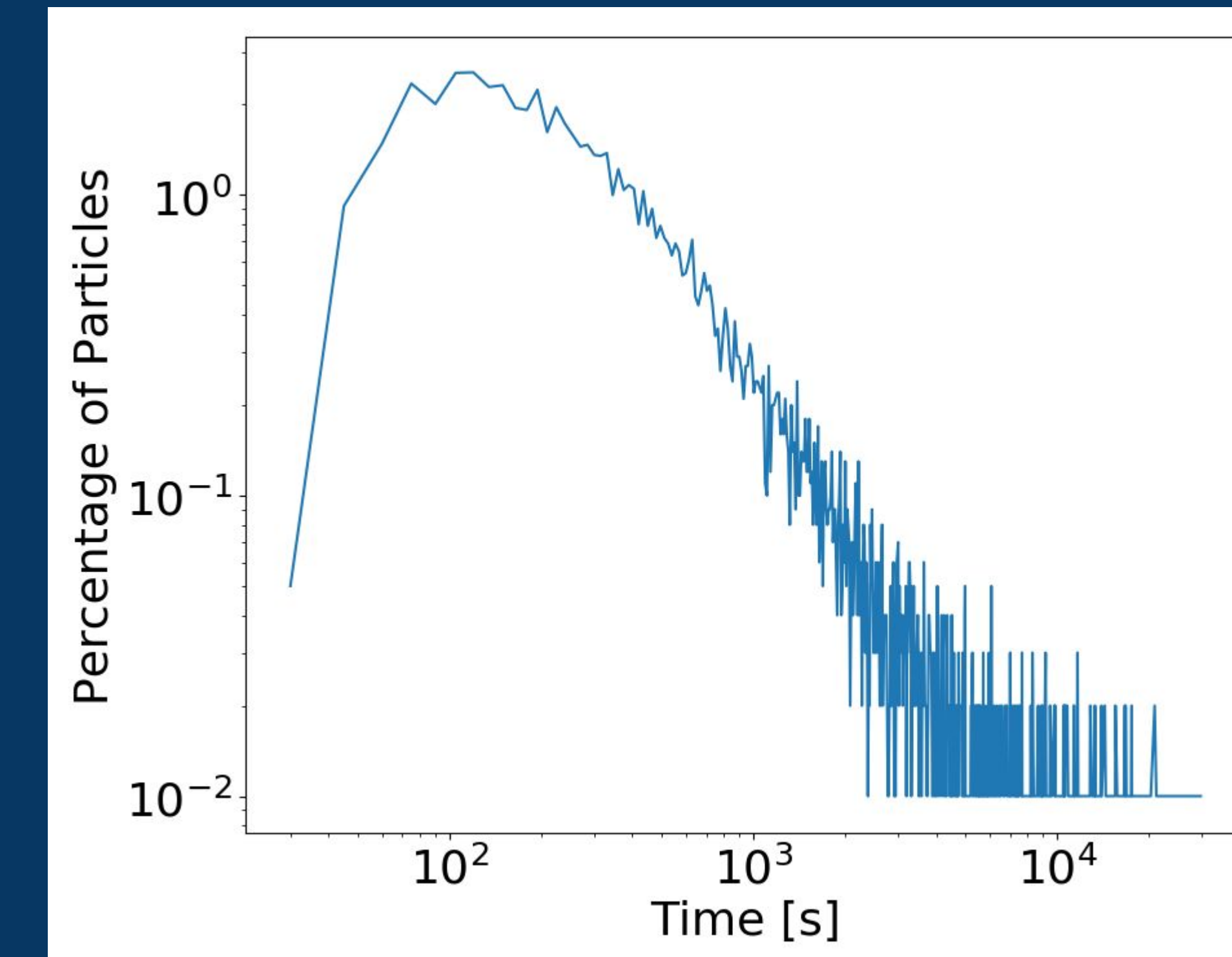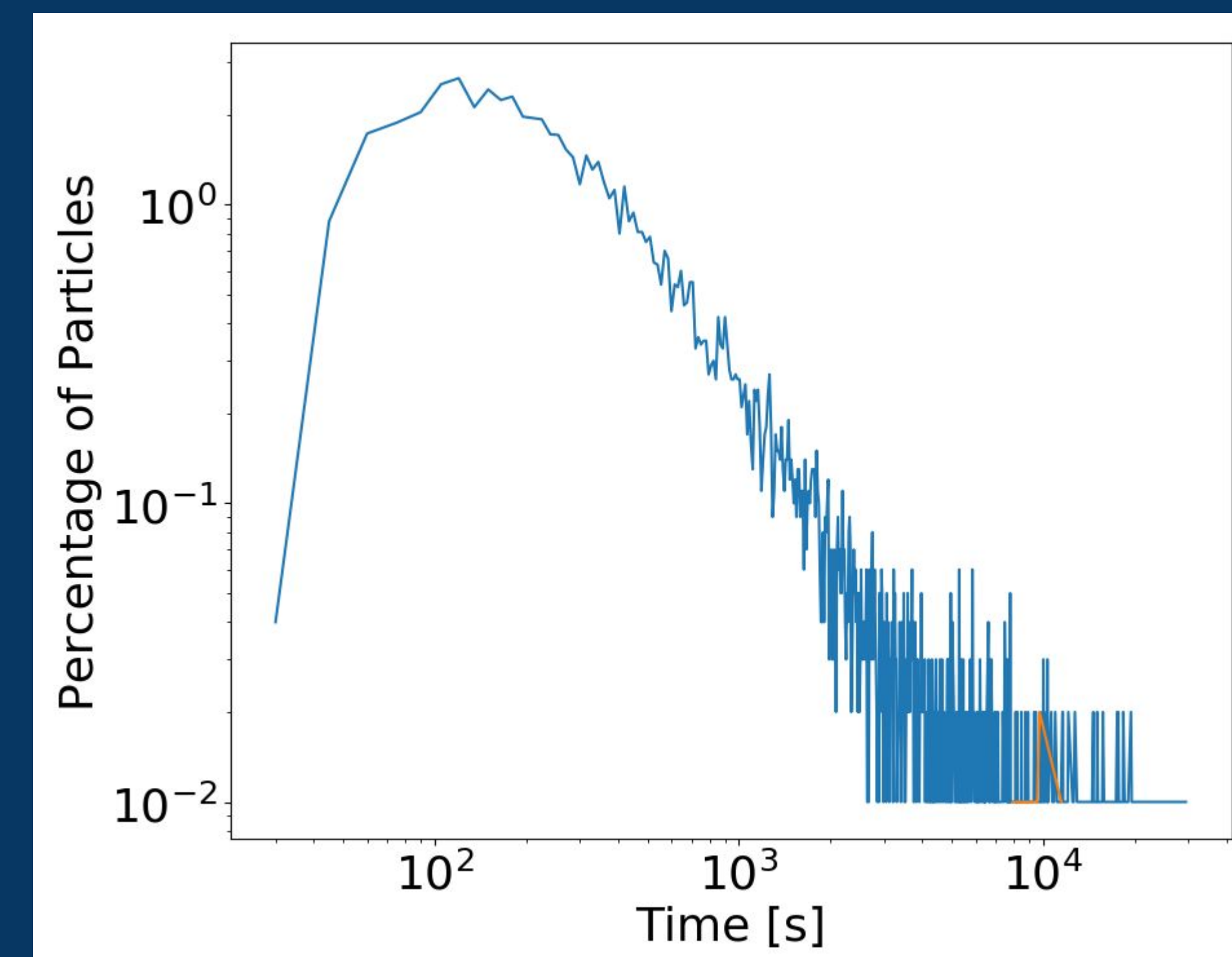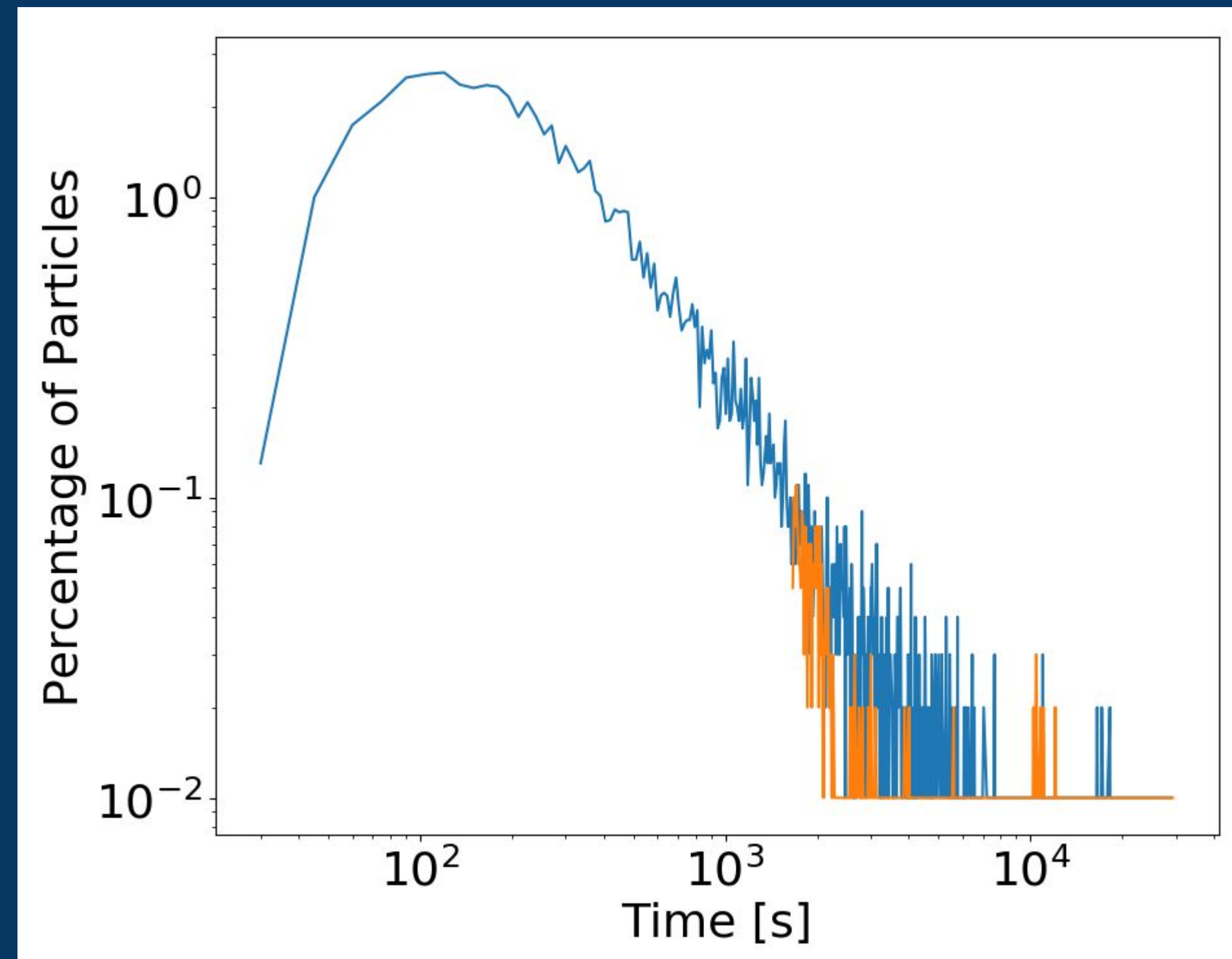
Variations in Orbital Elements:
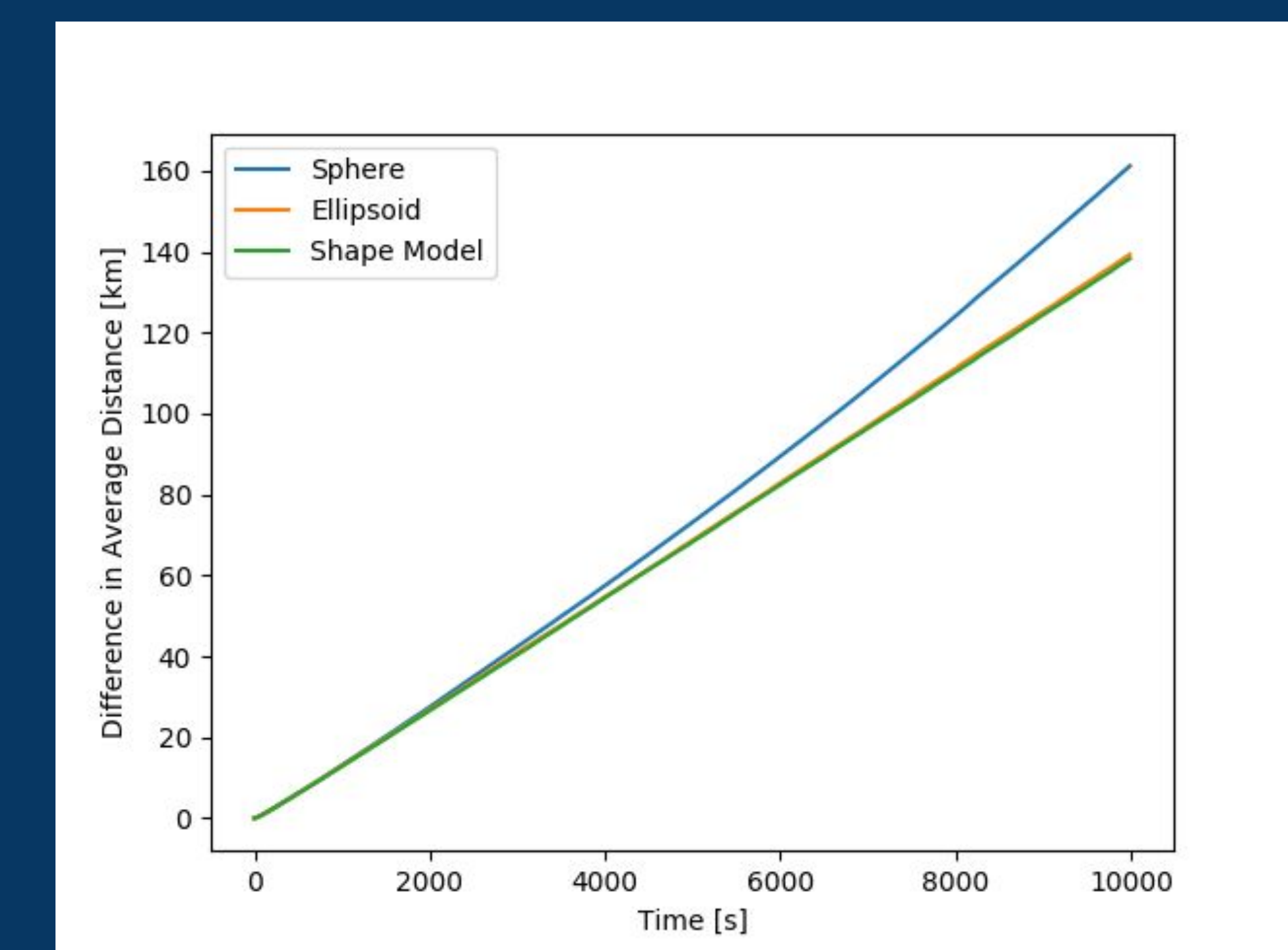
Conclusions:

Variations in shape become most evident when the size ratio between the primary and the secondary bodies is smaller. Long term simulations make it evident that approximating non-spherical small bodies leads to long term inaccuracies in simulation outcomes. Variations in difference between the primary and secondary show little influence on orbit outcomes in the long term. A small separation between primary and secondary also increases the chance of particles from an impact landing on the binary.

For small variations in body shape in comparison to the ellipsoid, an ellipsoidal approximation is sufficient. For more heavily cratered or contact binaries, the shape and conditions of the system significantly influence the accuracy of the simulations in the long term. Small perturbations initially from the surface later play a large role in influencing the debris dynamics.