

# Free-Floating Planets in the Era of Roman

William DeRocco (University of Maryland)

Contact: [derocco@umd.edu](mailto:derocco@umd.edu)



Overview: Free-floating planets (FFPs) are planets that do not orbit a star. Ground-based microlensing surveys have detected the first hint of this population, and the detections imply these terrestrial FFPs may outnumber terrestrial planets by over a factor of twenty-to-one [1]. This surprising result implies that FFPs may be the largest demographic of exoplanet in the Galaxy. If we want to truly understand this population, we need more observations. The *Roman Space Telescope*, set to launch in 2026, will detect hundreds to thousands of FFPs [2], answering fundamental questions about their origins and Galactic distribution.

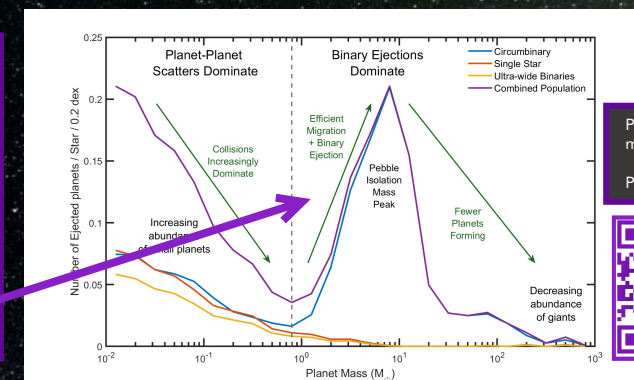
## Predicting the Galactic population of free-floating planets from realistic initial conditions

DeRocco & Coleman. 2025 MNRAS 537 3 2303–2312.

Motivation: What kind of distribution of FFP masses should Roman expect to see?

Methods: Dedicated ab initio simulations of system evolution from initial planet formation all the way through ejection for a wide variety of stellar systems.

Key Result: Circumbinary ejections dominate at Neptune masses. Strong non-monotonic feature near pebble isolation mass in these systems — simple power-law extrapolation is *not* sufficient!



Predicted FFP mass function [3]

Paper link:



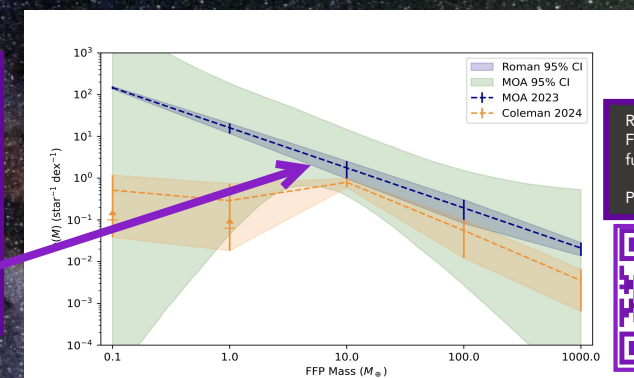
## Reconstructing the Free-floating Planet Mass Function with the Roman Space Telescope

DeRocco et al. 2025 AJ under review, arxiv: 2505.00092.

Motivation: How can Roman leverage statistics to discover unique features in the FFP distribution?

Methods: Large-scale simulations of Roman survey data to produce Bayesian framework for FFP mass function reconstruction.

Key Result: Roman will be able to discriminate between multiple hypothesized mass functions!



Reconstructed FFP mass function [4]

Paper link:

