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Mapping Gravity with Extragalactic Streams and Citizen Science

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Wide-field surveys like Euclid mark a new era of extragalactic stellar stream studies, with exciting applications in measuring baryon and dark matter distributions, and connecting galaxies to their cosmological context. I present results from a pilot study combining Euclid imaging with Zooniverse classifications to detect and analyze streams. We use projected stream morphologies to constrain the shape and barycenter of each host galaxy's potential, jointly probing baryonic and dark matter distributions. These inferences complement lensing, with sensitivity to halo geometry on tens of kpc scales. The method enables both stacked, population-level constraints on halo triaxiality and barycenters, and individual-halo inference on the same. Already, we find promising agreement with Λ CDM predictions. Our program will identify thousands of streams, enabling precise constraints on halo shapes and barycenters across large samples and redshifts, offering a new dynamical test of dark structures.

References

Nibauer et al 2023 – [10.3847/1538-4357/ace9bc](#)

Author: STARKMAN, Nathaniel (MIT Kavli Institute for Astrophysics and Space Research)

Co-authors: Mr NIBAUER, Jake (Princeton); BOVY, Jo (University of Toronto); NECIB, Lina (MIT); Dr WALMSLEY, Michael (University of Toronto); Prof. PEARSON, Sarah (University of Copenhagen); Mr WU, Sirui (University of Copenhagen)

Presenter: STARKMAN, Nathaniel (MIT Kavli Institute for Astrophysics and Space Research)

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