TIDAL DISRUPTION OF DWARF GALAXIES
THE STRANGE CASE OF CRATER II

1. Observations
2. Explanation – Gaia DR2
3. Tidal disruption results

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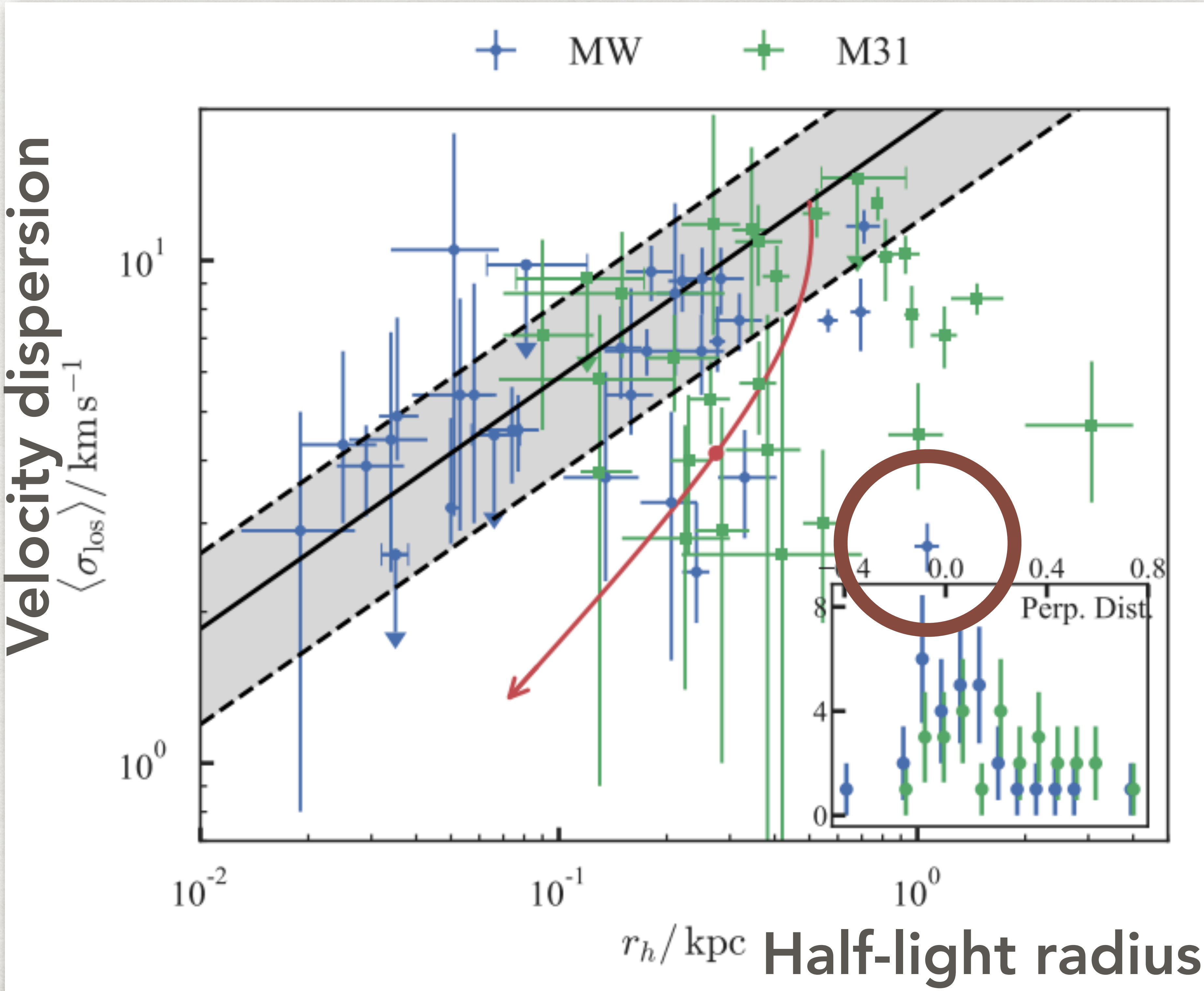
arXiv:1802.09537

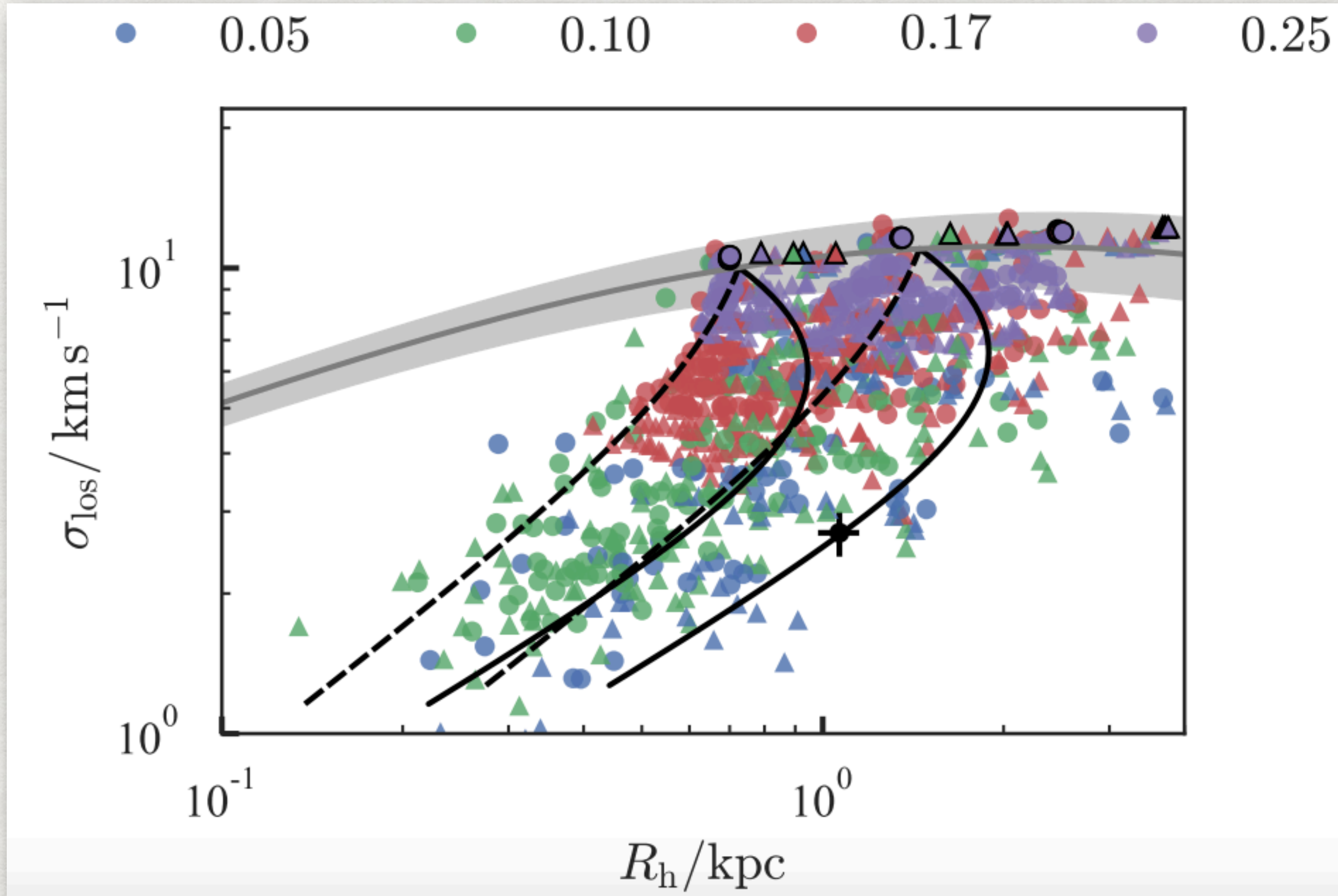
WHY IS CRATER II STRANGE?

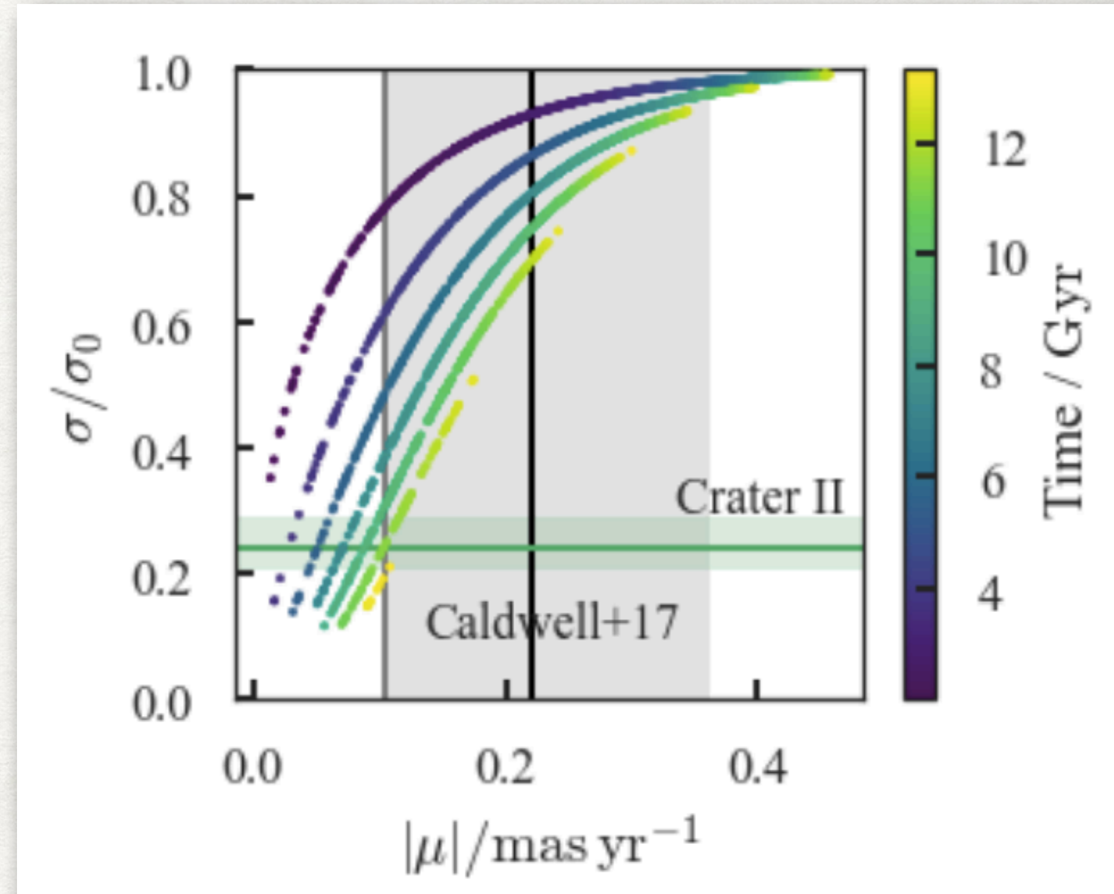


<u>Explanations</u>

1. Formation
2. Projection effects
3. Tidal disruption
4. Alternative theories of gravity

EXPLANATION

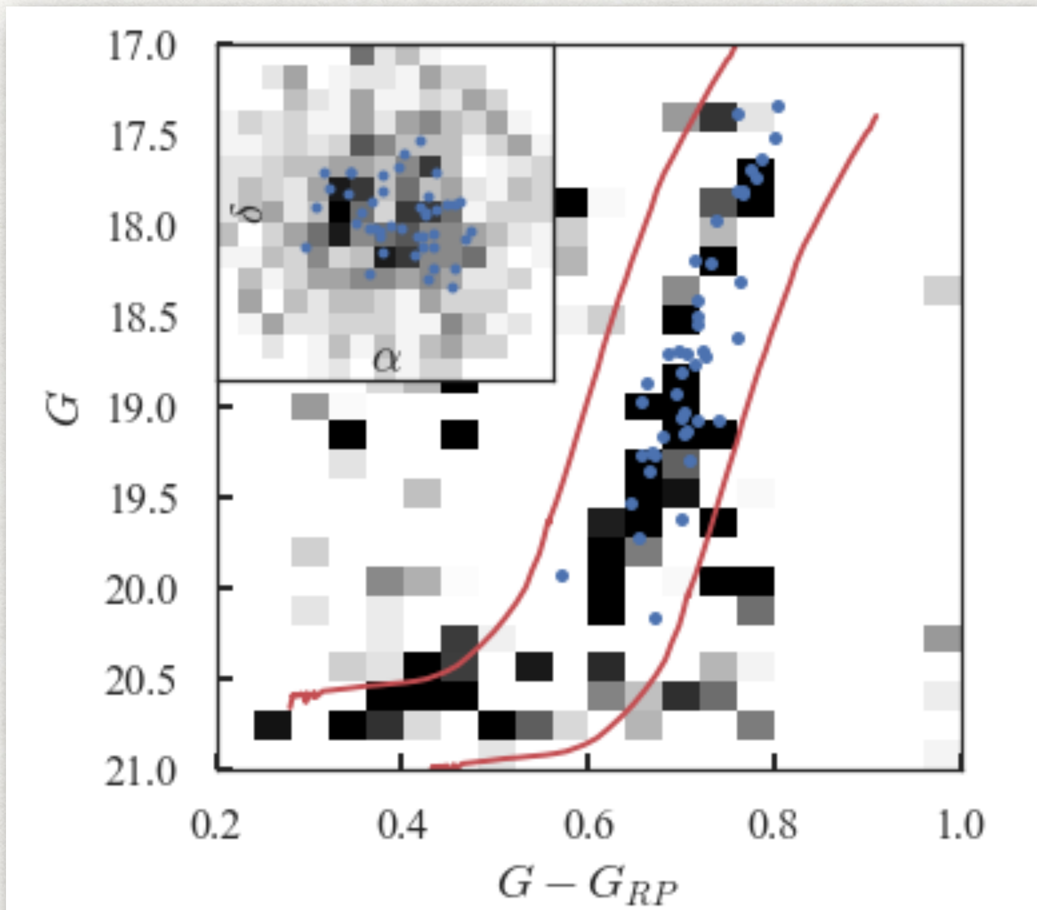


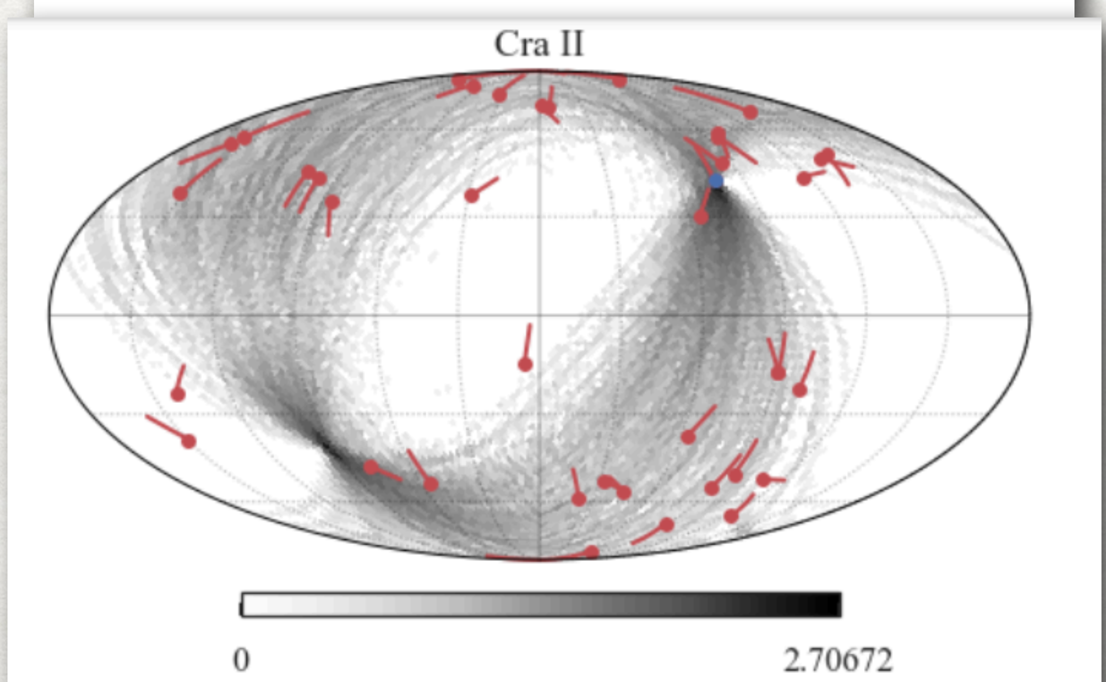


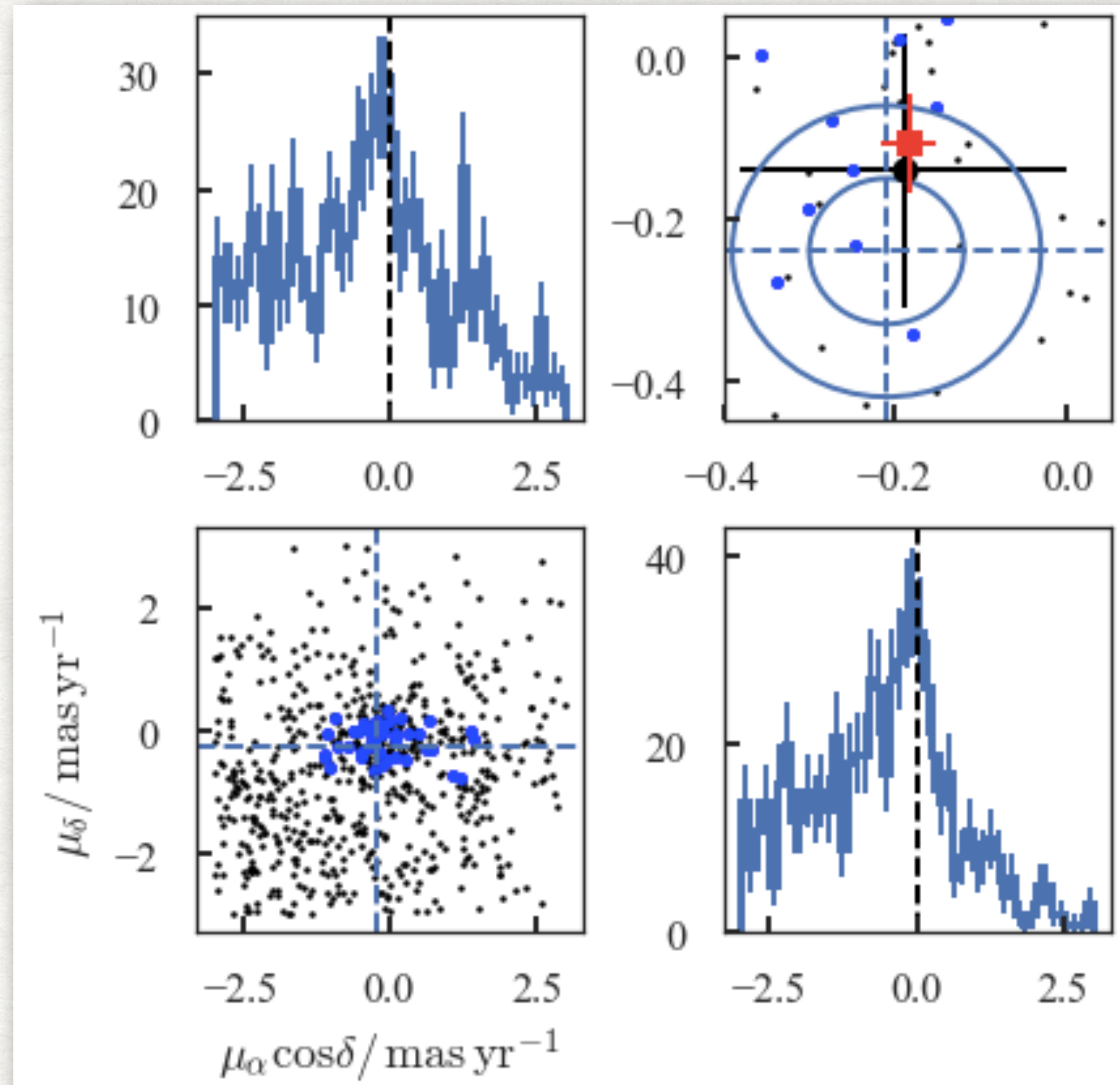
- Ran a suite of controlled two-component N-body simulations in a fixed Milky Way potential
- Varied the flattening of C2, how embedded the stars are and the unknown proper motion.
- Tidal disruption suppresses velocity dispersion (consistent with Penarrubia et al. 2007) — proper motion relative to solar reflex must be small to explain C2.

CONFIRMATION WITH GAIA DR2

FRITZ ET AL. 2018





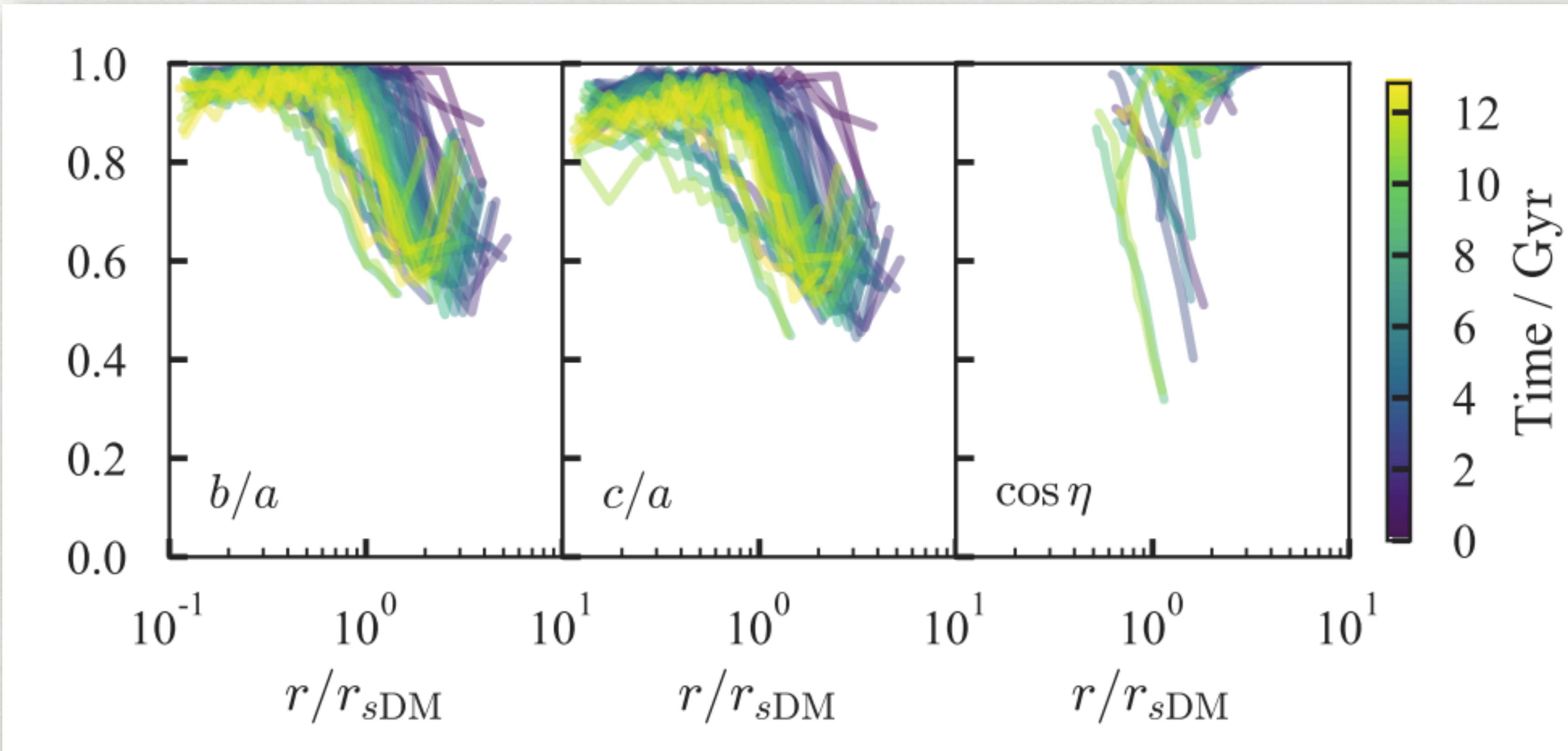


Fritz

Caldwell

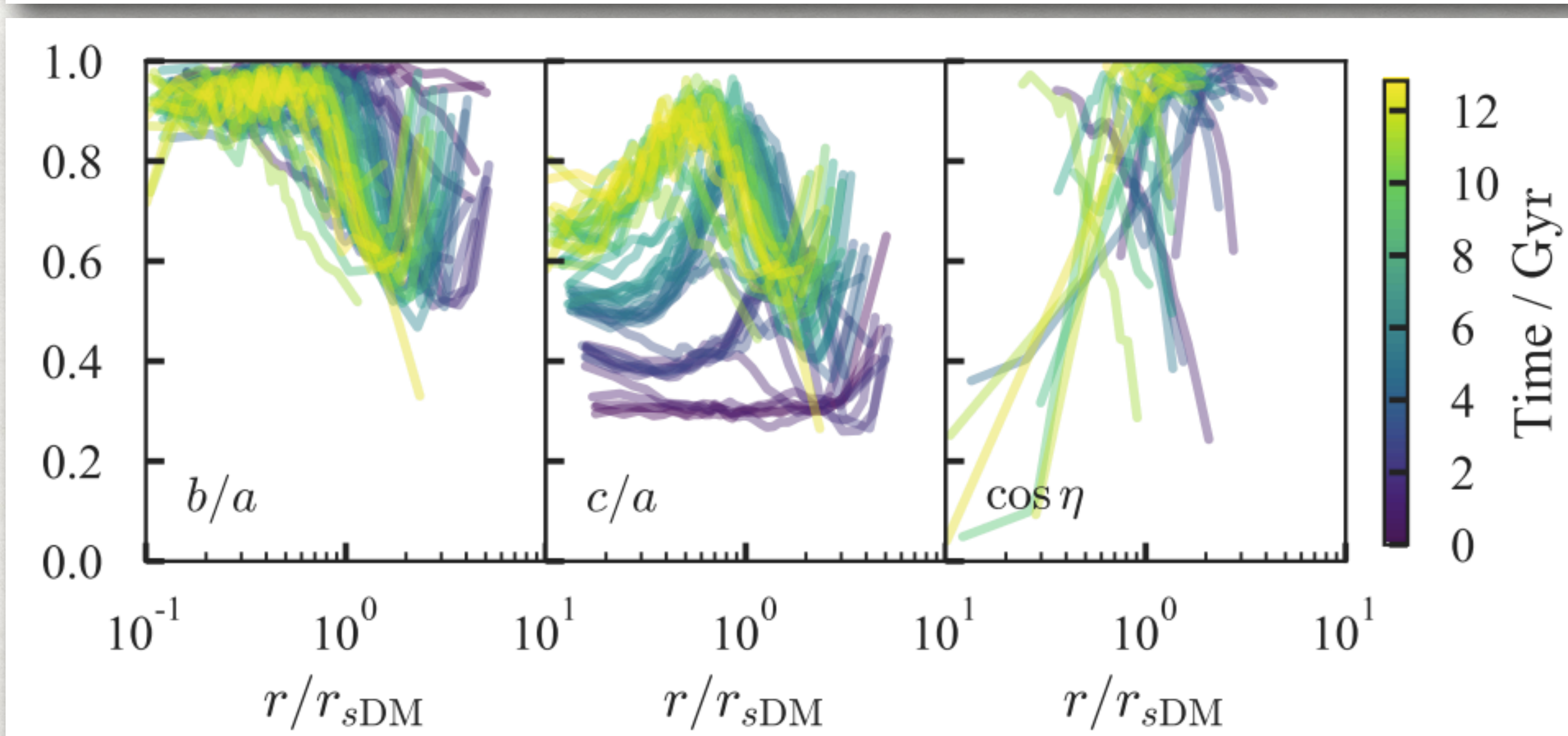
- Proper motion of C2 measured by Fritz et al. (2018) from Gaia DR2
- Agrees well with Caldwell et al. (2017) (from RVs)
- Consistent with tidal disruption scenario

OTHER RESULTS



Spherical model

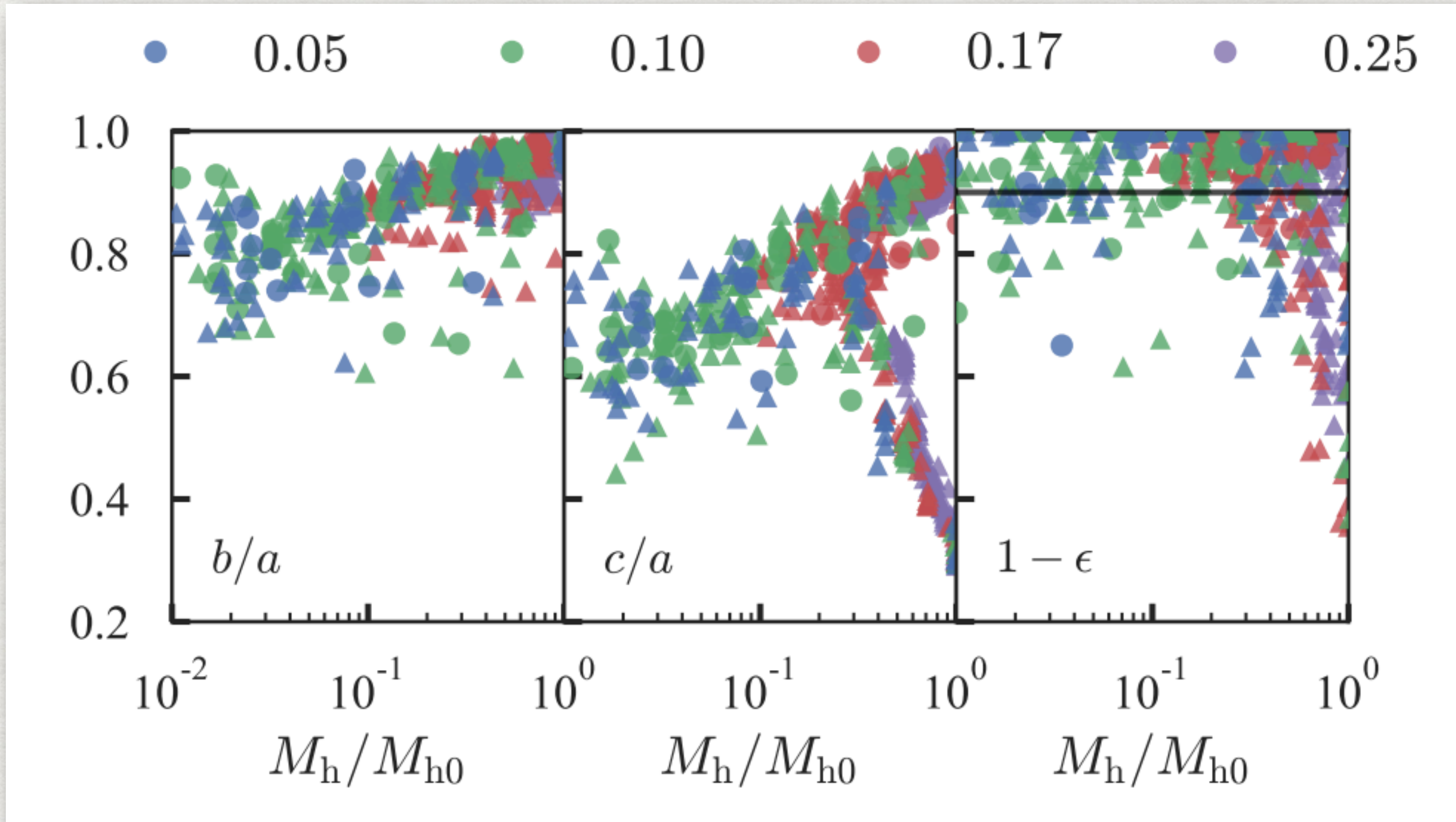
- Becomes prolate and tidally locked in outskirts



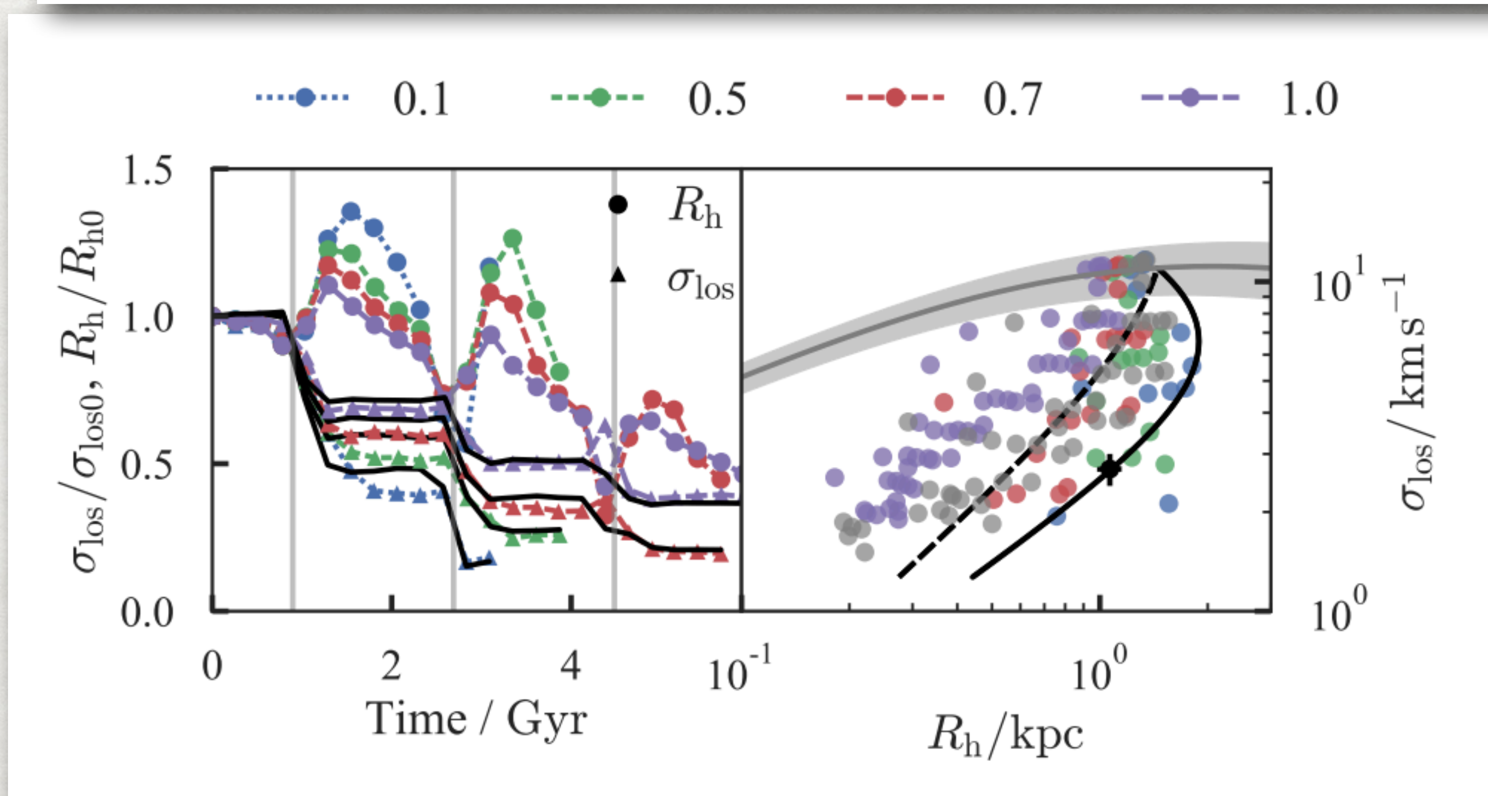
Flattened model

- Each pericentric passage shocks the dSphs to become more spherical.
- Outskirts tend to prolate and tidally locked.

OTHER RESULTS



- Models fall on sequence in shape. Disrupted models become steadily more prolate (within half the initial radius)
- Flattened models become rounder then join the sequence
- All heavily disrupted models appear round.



- Cuspy models tend to overshoot C2
- More cored models balloon more at each pericentric passage so are more consistent with C2 — but don't last as long.