The globular cluster mass function (GCMF) is one of the primary observational constraints on the formation and evolution of globular clusters.

- Evaporation as currently understood accounts well for the observed GCMF in the inner regions of the Galaxy and M87 (e.g. Waters talk). Good.

- However, this agreement does not extend to the radial behavior of the GCMF. Bad.

  The problem - theory suggests there should be an observable radial trend - basics physics, smaller tidal radii (r_t) nearer the center of a galaxy, more rapid mass loss $\Rightarrow$ GCMF(r) trend.

  Observations indicate a mostly constant GCMF(r) and are inconsistent with this theoretical prediction (e.g. Vesperini et al. 2003).

What is going on ?

How to Explain Constancy of GCLF(r)

NOT due to GC orbits alone

- **M87 GCLF is constant with radius.**
- **M87 GCS velocity data indicate only mild or no orbital anisotropy.**

⇒ VZKA03 showed the need an explanation beyond orbits.

McLaughlin & Fall (2008) - Galactic GCMF(r) is consistent with evaporation from observed half-light densities. Tidal densities really needed - evaporation depends on r_h/r_t (or c). Tidal results do not disagree with r_h, but are noisier.

Key unanswered question – why does r_h and maybe r_t behave with distance from galaxy center as it does? Possibilities

Understanding the GCMF and GC radii, mass and galactocentric distance relations

Possibilities

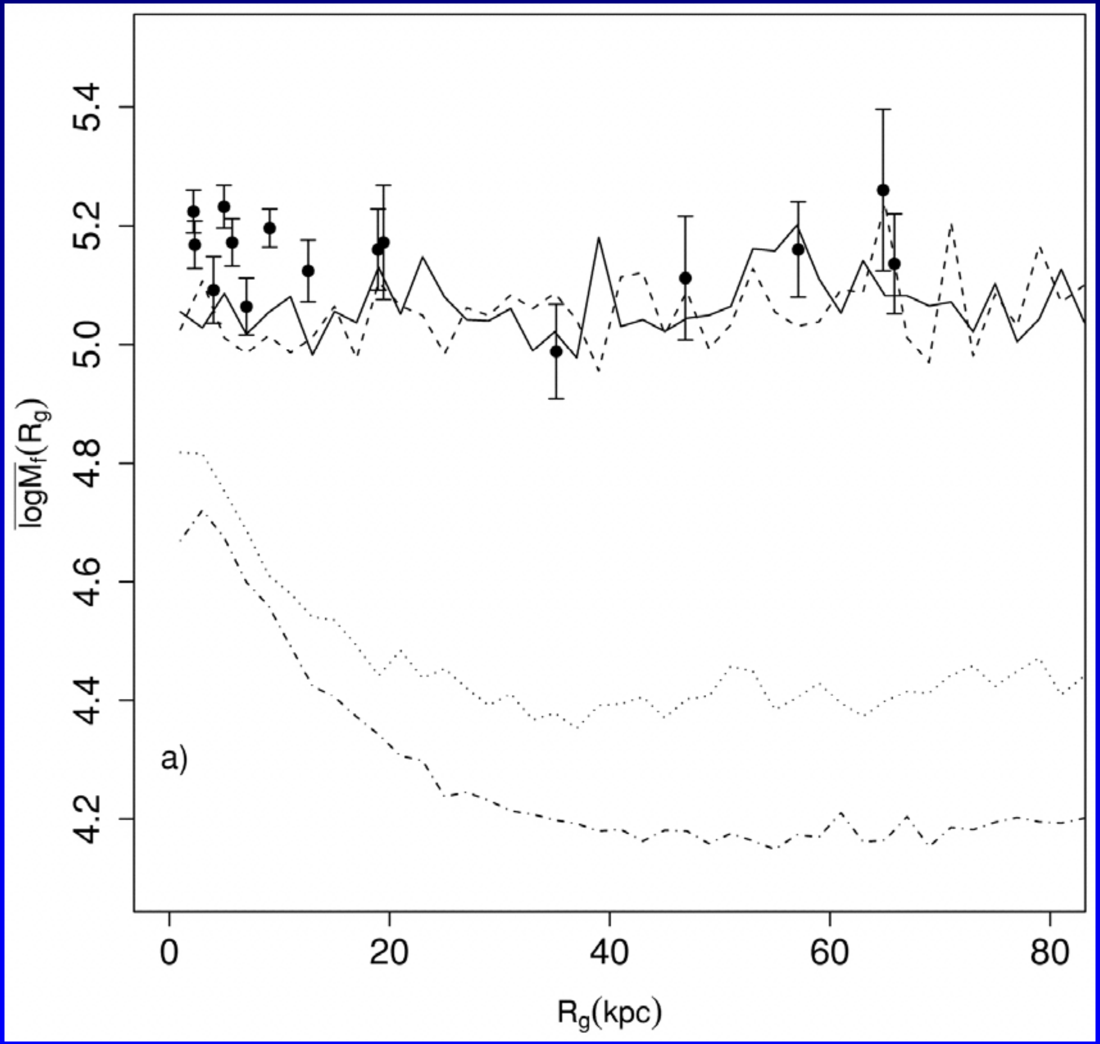
1. Tidal radius previously set at other places/times, maybe by hierarchical structure formation. BUT, GC will fill its current tidal radius on a ~dynamical time. AND, how much orbit mixing is there?

2. r_t behaves as expected, and r_h trends caused by concentration dependence on GC mass and location (see also Kundu 08/arXiv for Galactic obs issues).

   "Pre-evaporation" conditions must then explain GCMF(r), e.g. VZ03, Parmentier & Gilmore, ….

3. ?, and it sure would help to understand the weak Mass-radius relation.

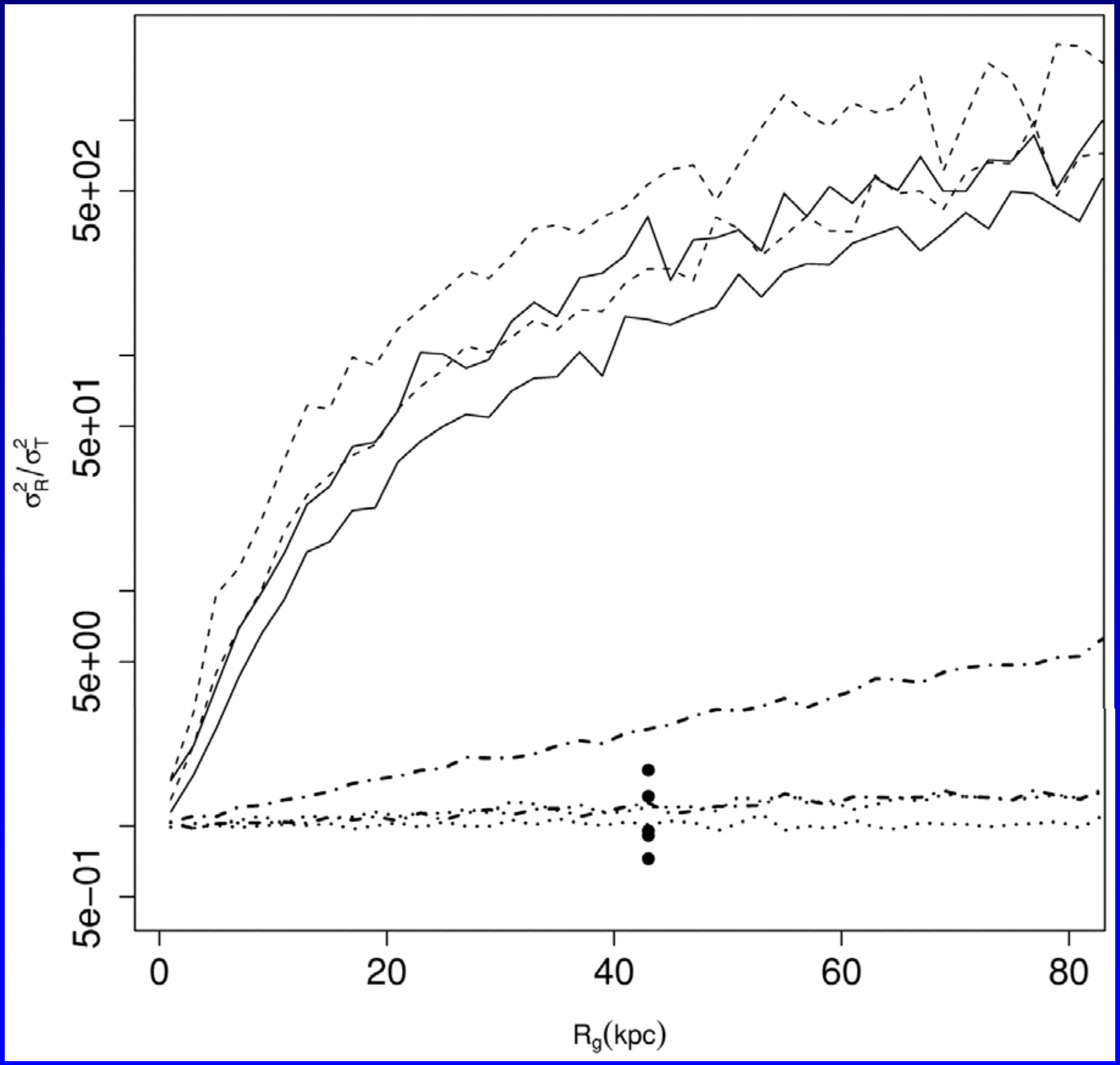
M87 GCLF(r)



Vesperini, Kundu, Zepf, & Ashman 2003, ApJ

GCLF has little or no variation in peak out to 75 kpc!

Orbital Anisotropy of M87 GCS



Vesperini et al. 03, points indicate anisotropy inferred from velocity data, upper lines represent models that give match GCLF(r) data.

Milky Way GCLF(r)