Mass-to-Light Ratios of Globular Clusters in M31 (and the Milky Way)

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(with Nelson Caldwell, Anil Seth, Matt Walker, Mario Mateo)
Mass-to-Light and $\text{[Fe/H]}$

(in the optical)

normalization may vary

12.5 Gyr
Kroupa IMF
Mass-to-Light and \([\text{Fe/H}]\) (in the near-IR)

12.5 Gyr
M31 GCs: Calculating M/L

\[ M_{\text{vir}} = \frac{7.5 \sigma_\infty^2 r_{hm}}{G} \]

high-res spectra + cluster structure

good imaging (pref HST)
M/L of 27 M31 GCs

Mostly multi-order Keck/Lick spectra

Strader et al. 2009

Djorgovski et al. 1997
M/L of 131 M31 GCs

Mostly single-order MMT spectra
K-band M/L

Strader et al. 2011

$M/L_K$ vs. $[Fe/H]$ (dex)
M/L with Mass

Strader et al. 2011

[Fe/H] < -1

[Fe/H] > -1
[Fe/H] > -0.3

renormalized
Kruijssen models
Ways to make M/L low

(i) Remove stars with high M/L  
    (low-mass dwarfs)

(ii) Add stars with low M/L  
    (RGB/AGB)
Mass Function and M/L

Strader et al. 2011

Kroupa IMF

typical GCs

most metal-rich GCs
MF implications

For metal-rich M31 GCs, favors:

\[ \frac{dN}{dM} \propto M^{-0.8} - M^{-1.3} \]

van Dokkum & Conroy (2010)
Galactic GCs

![Graph showing the relationship between M/LV and [Fe/H] for Galactic GCs, with markers for M31 and Milky Way, and a line representing a 12.5 Gyr Kroupa IMF.]

![Graph showing the velocity dispersion σ versus radius for NGC 6388.]

\( M/L_V \) vs. \([Fe/H]\) (dex)