Kinematics and Scalings of M31 dSph Satellites

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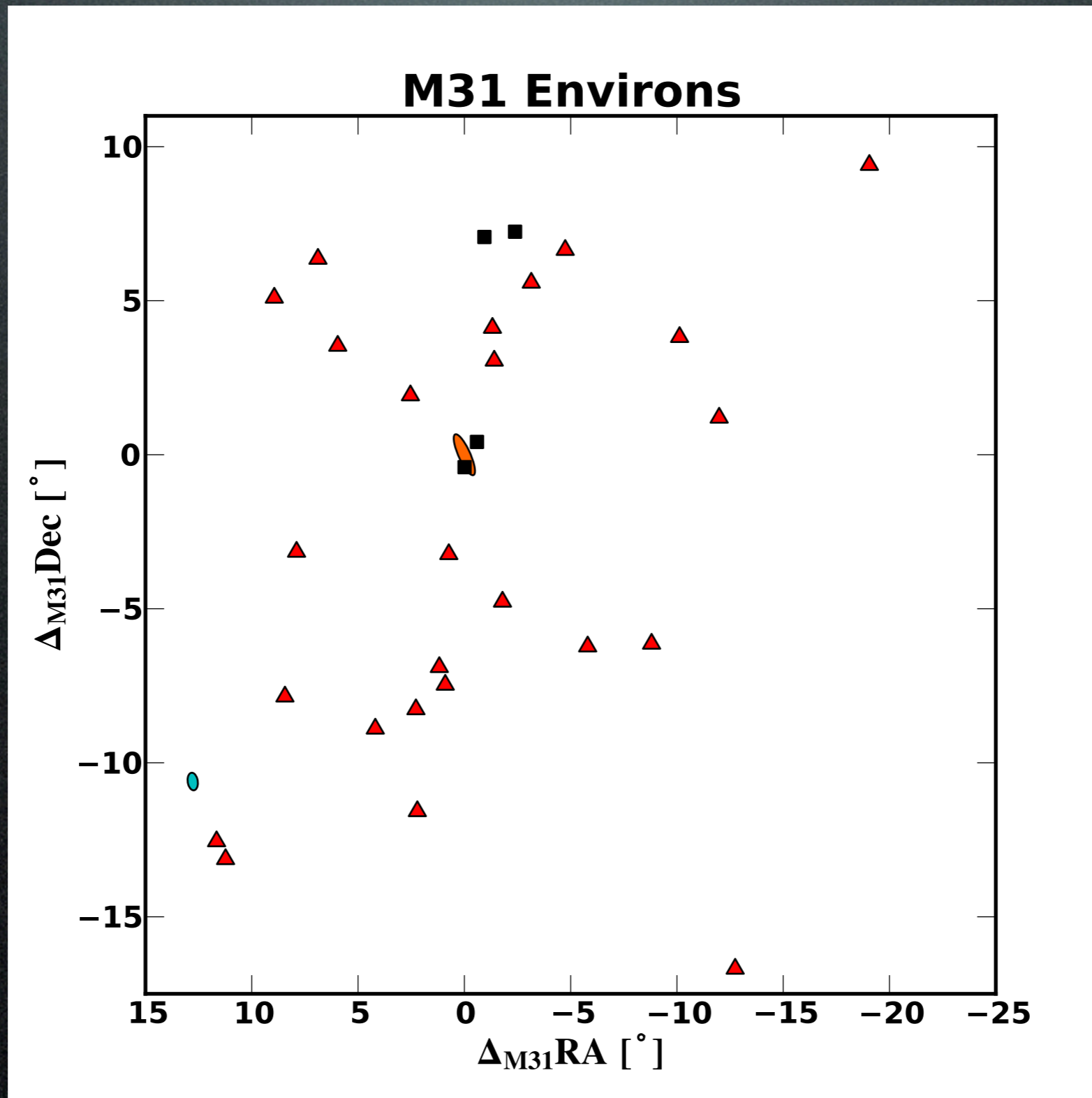[1]UVa, [2]UCI, [3]UCSC, [4]Yale, [5]STScI

UCSC Galaxy Formation Workshop 2011

Why M31 Satellites?

- We can get resolved star spectra!

- Data point #2 for MSP, MFs, Strigari plot, etc: Are the M31 satellites different from MW sats?
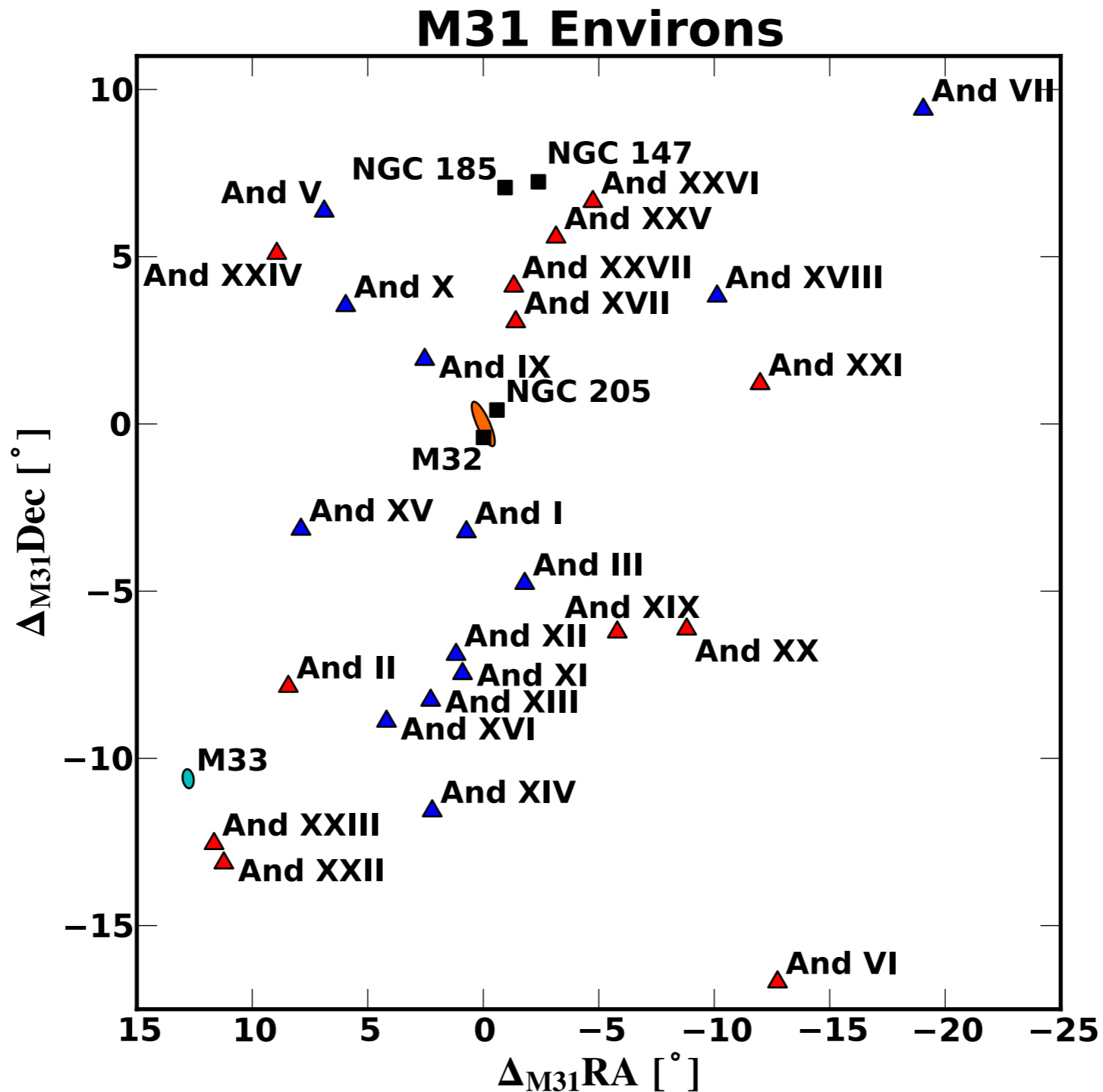

Robert Gendler
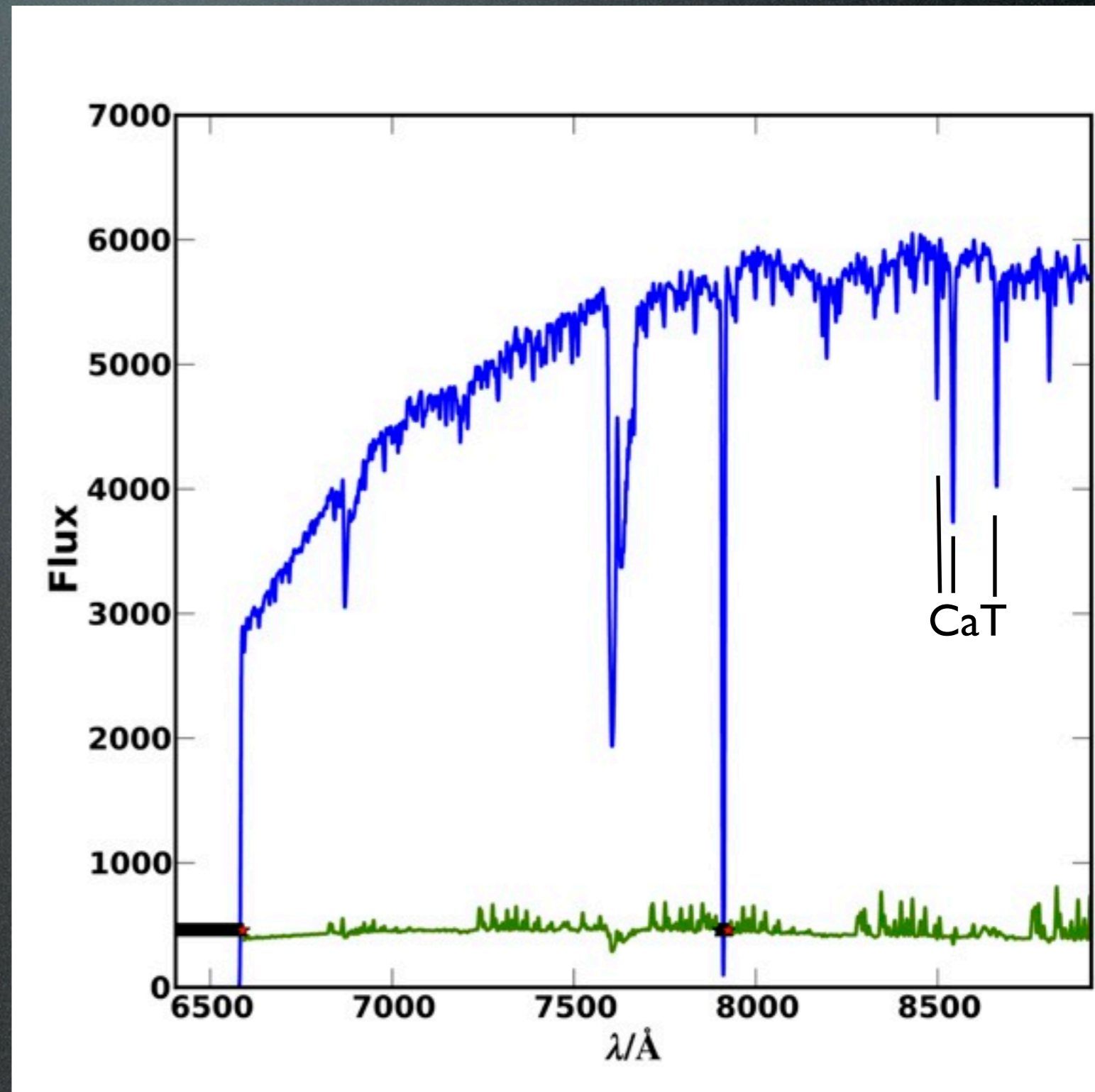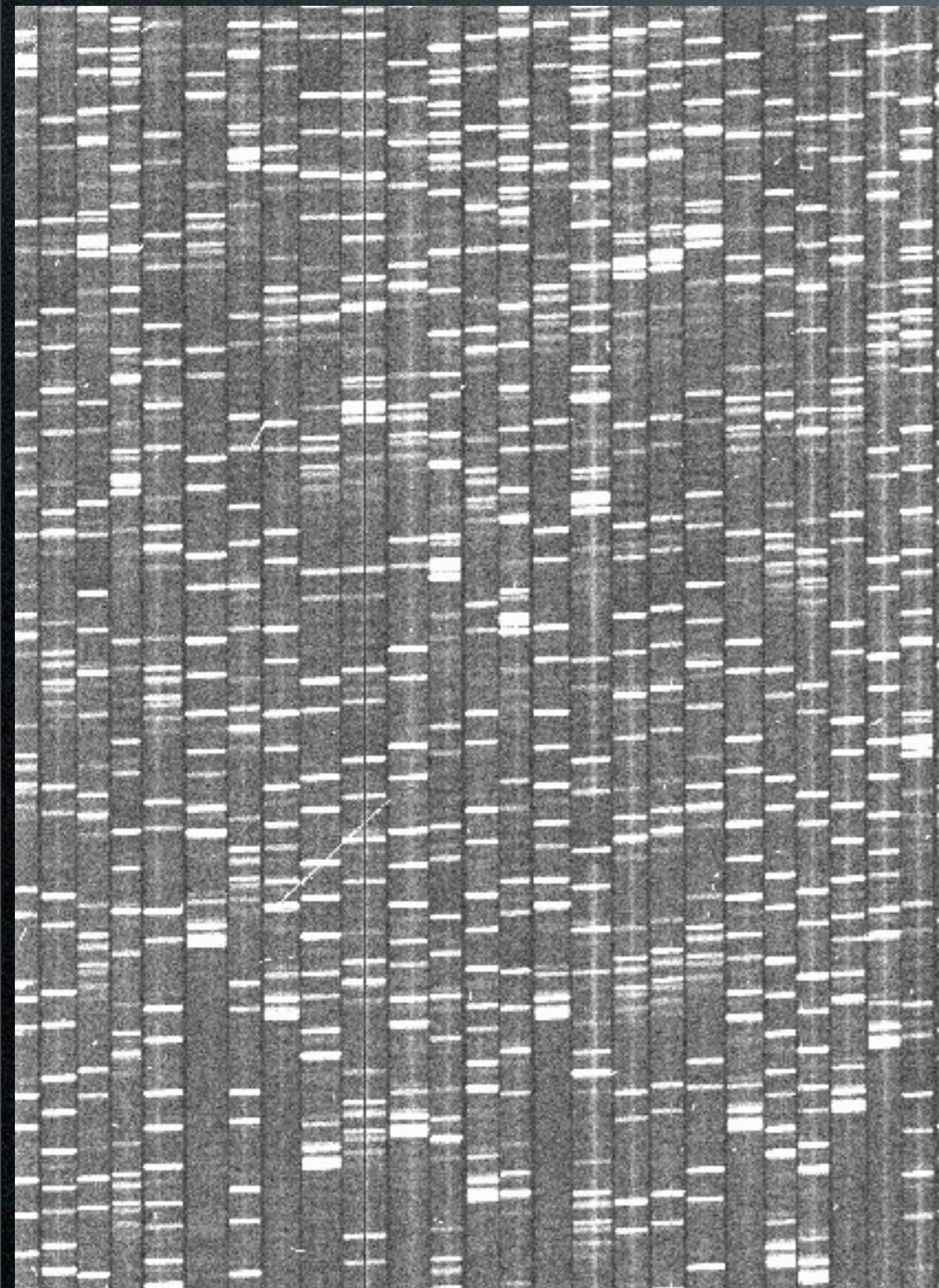
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M31 Satellites

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SPLASH dSphs

M31 Environs

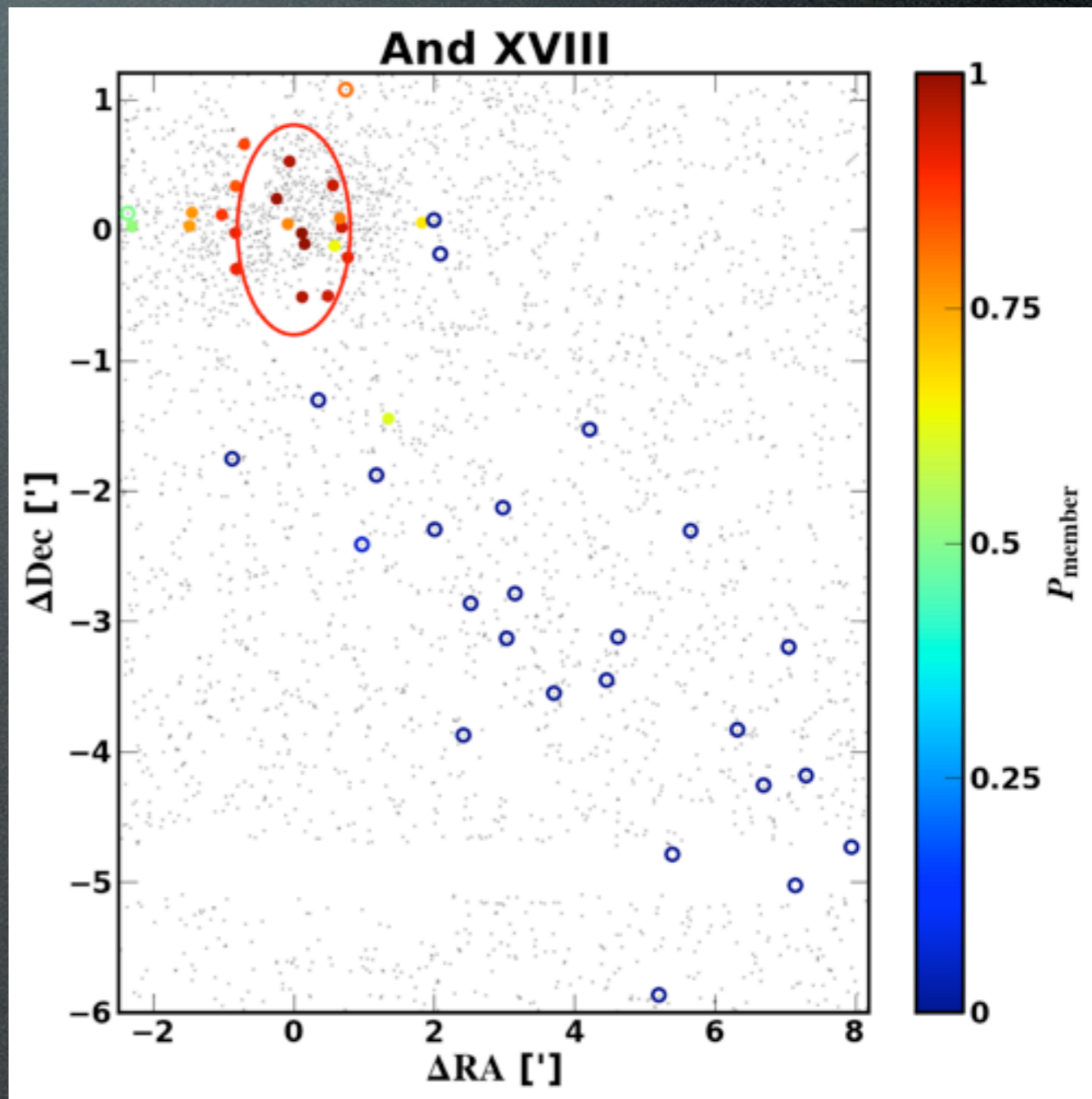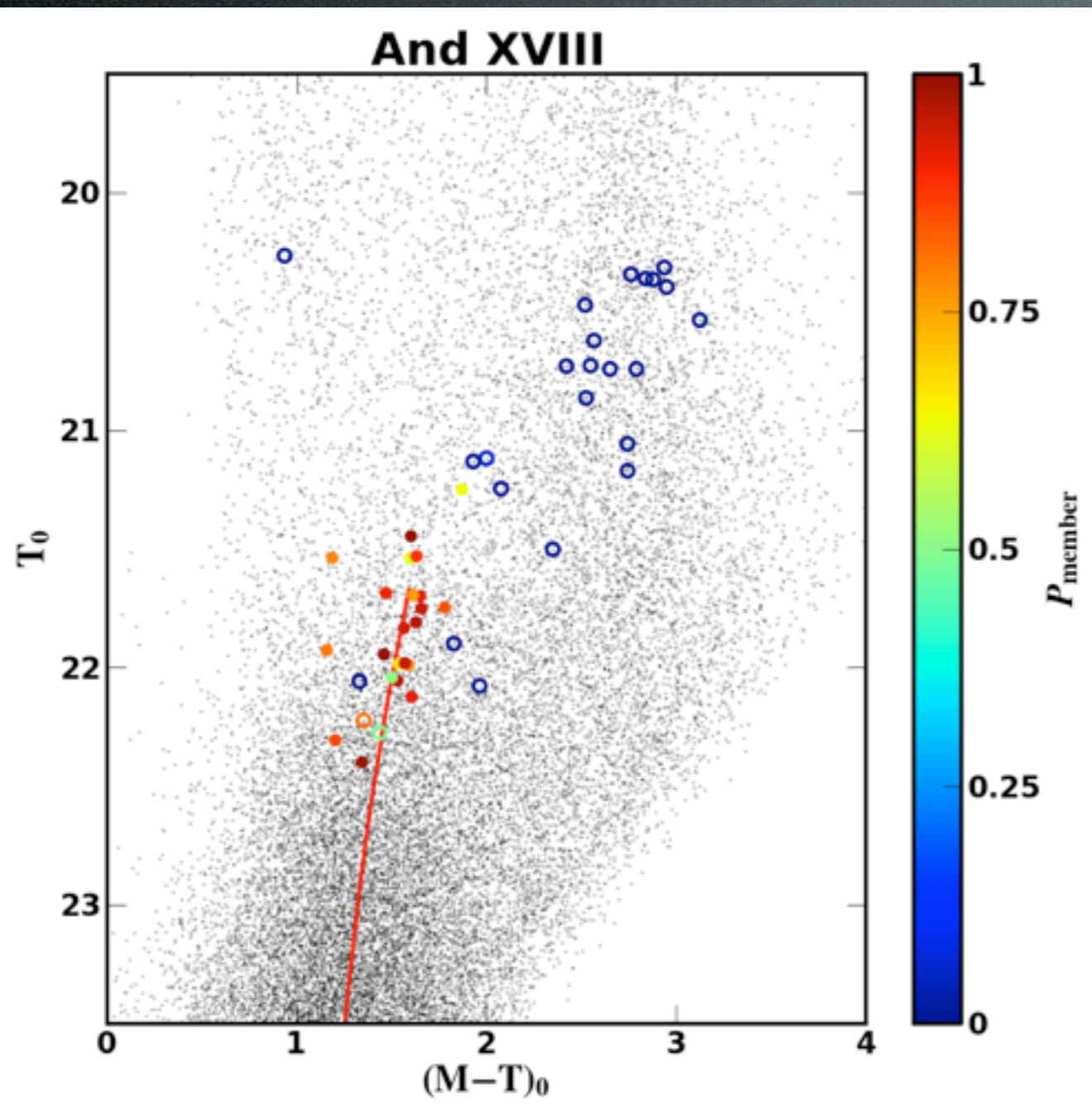Kalirai+ 10:
And I
And III
And VII
And X
And XIV

And V
And IX
(And XI)
(And XII)
And XIII
And XV
And XVI
And XVIII

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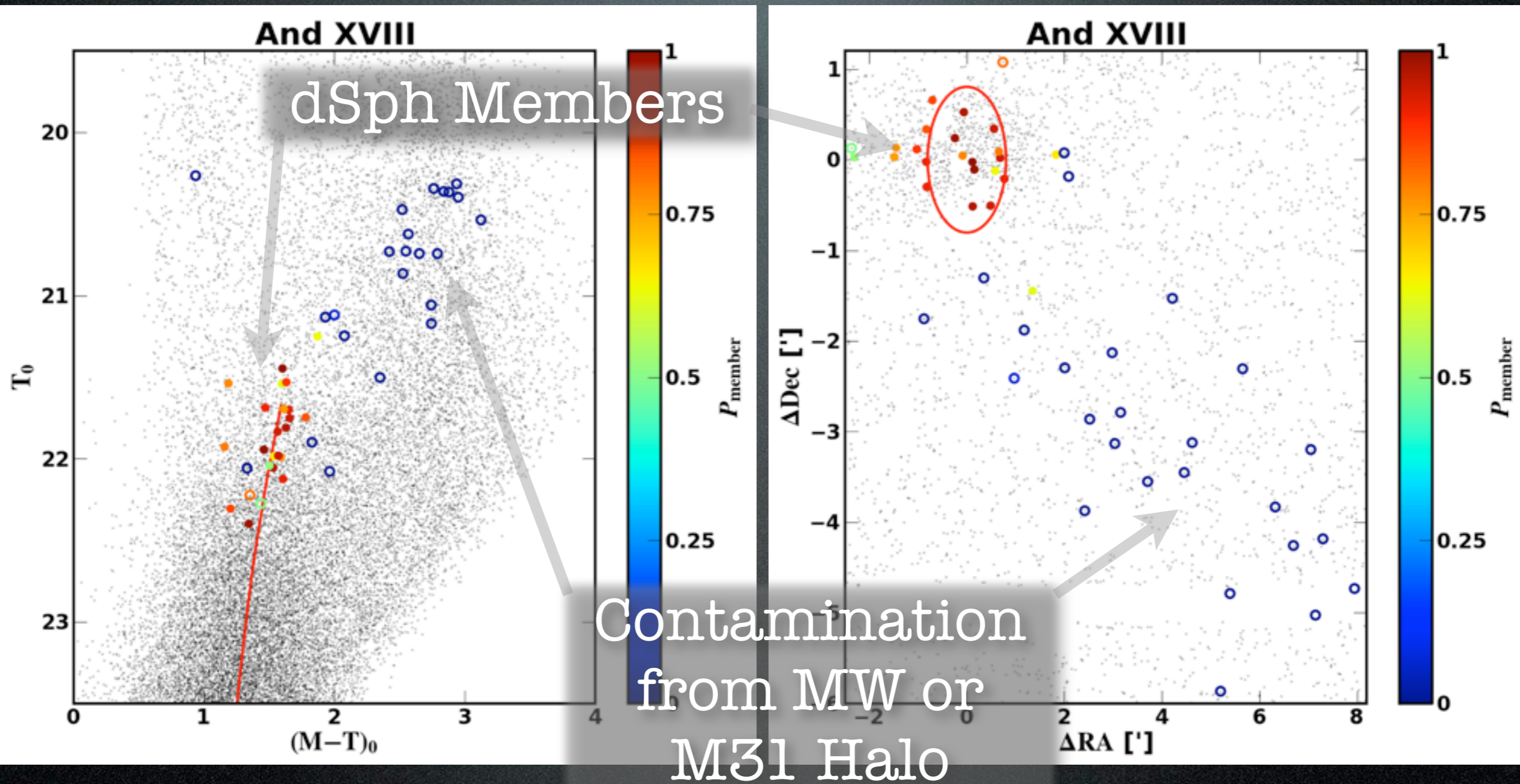# Velocities from Keck/DEIMOS Spectroscopy

Member Selection

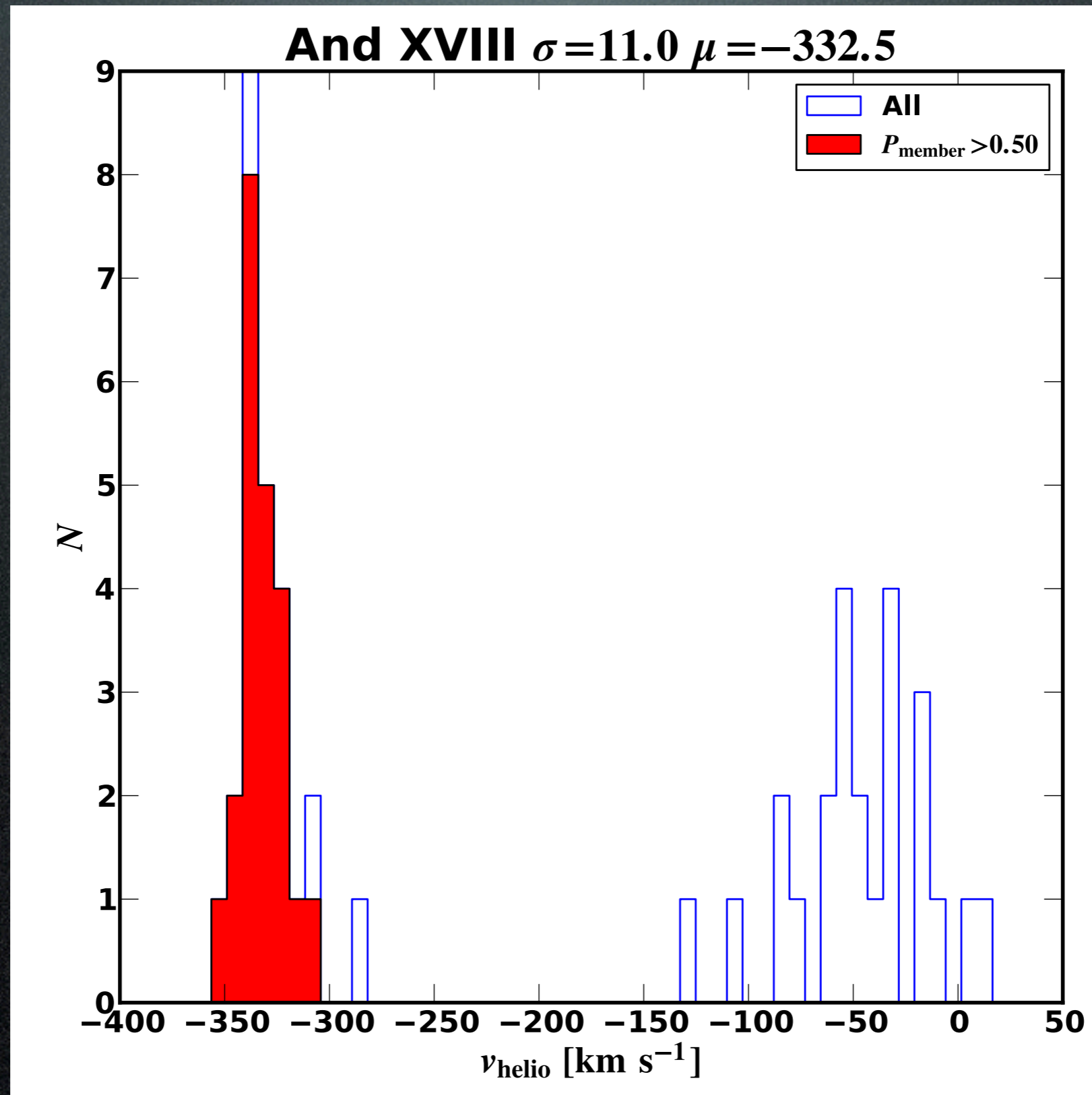E. Tollerud

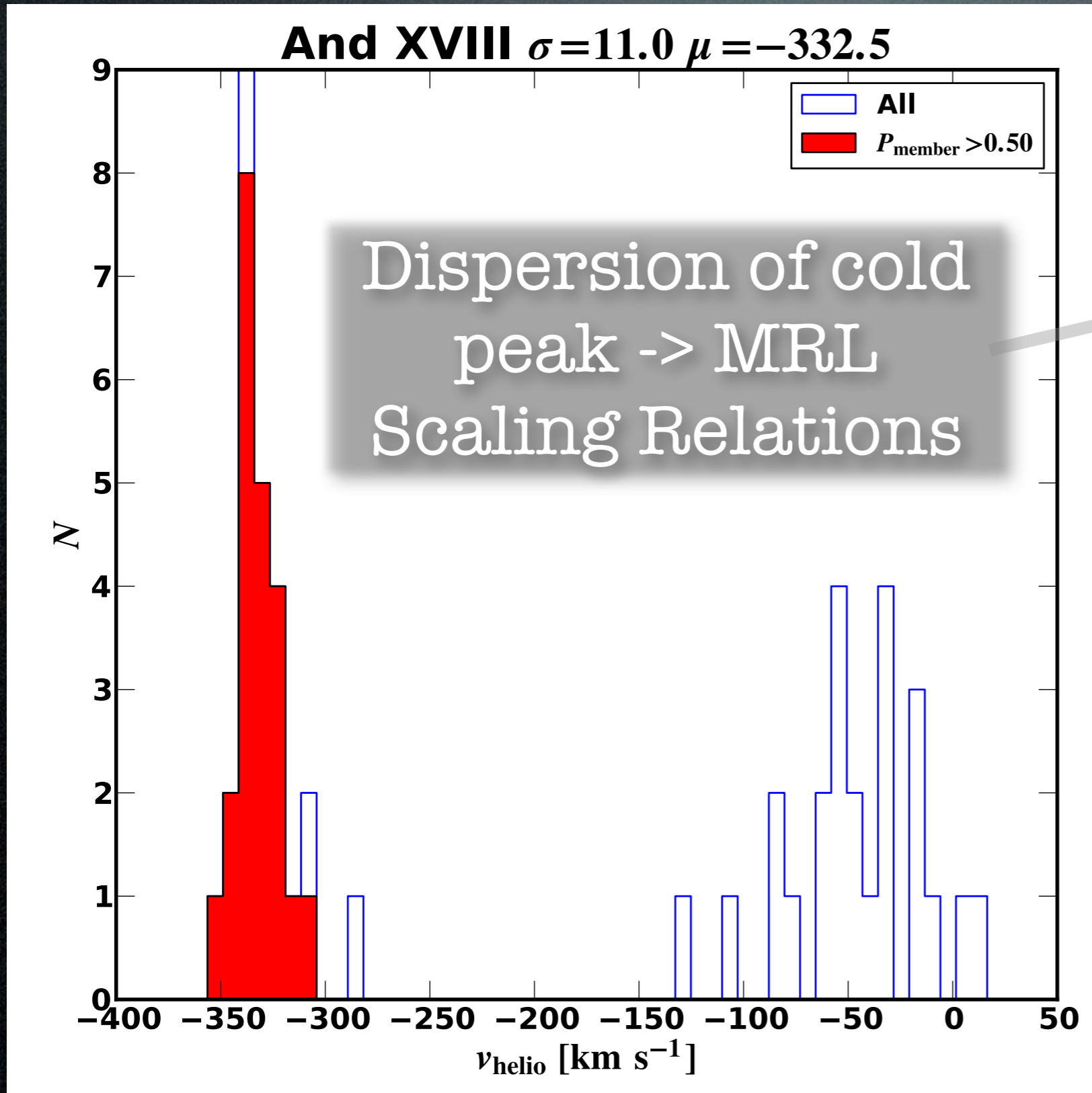# Member Selection

And XVIII

dSph Members

Contamination
from MW or
M31 Halo

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Member Selection

Coherent Velocities

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M31 dSph Kinematics

And XVIII $\sigma = 11.0$ $\mu = -332.5$

Legend: All; $P_{\mathrm{member}} > 0.50$

Axes: N vs v_{helio} [km s^{-1}]

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M31 dSph Kinematics

And XVIII $\sigma = 11.0$ $\mu = -332.5$

All
$P_{\mathrm{member}} > 0.50$

Dispersion of cold peak -> MRL Scaling Relations

N

v_{helio} [km s^{-1}]
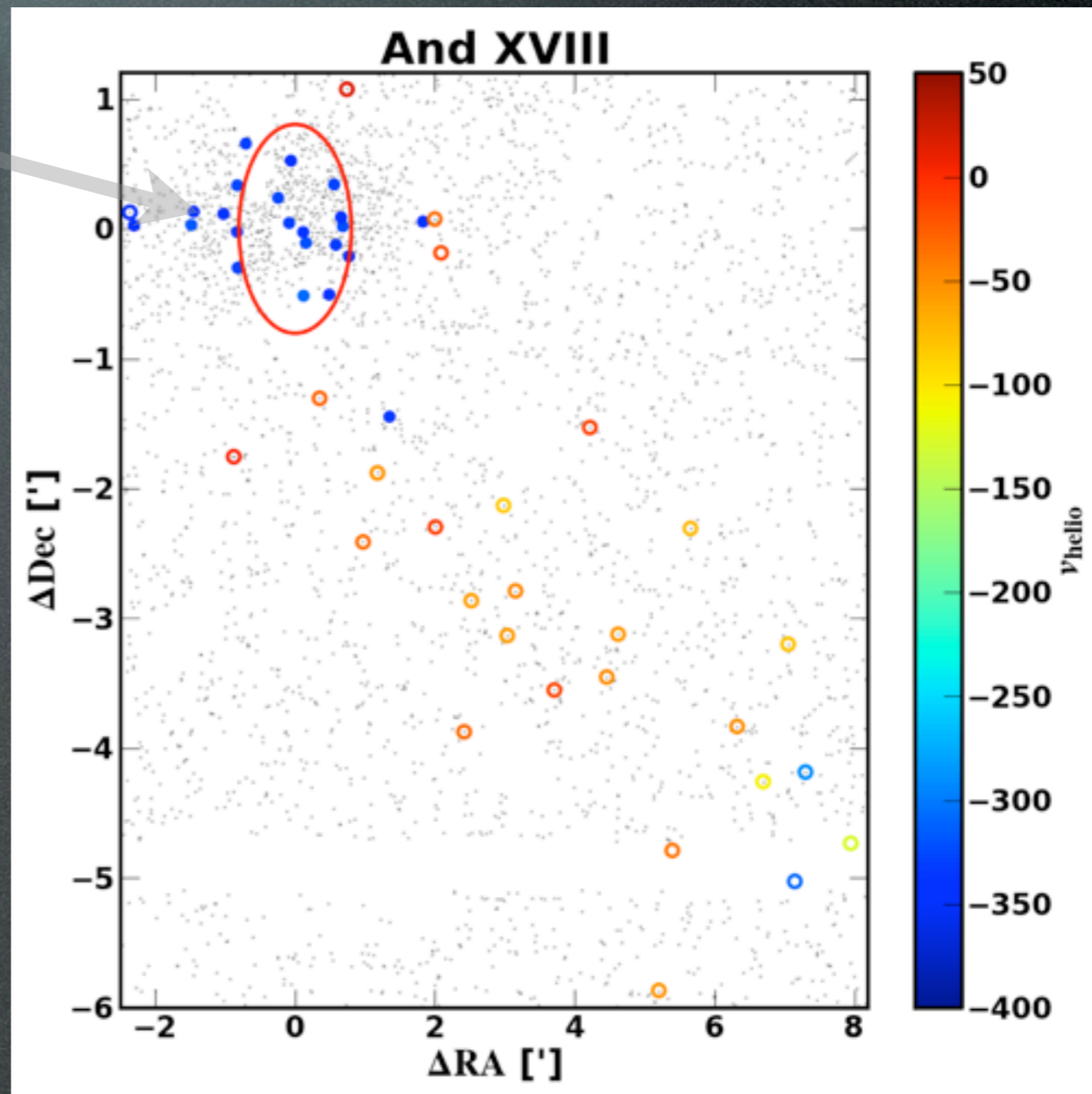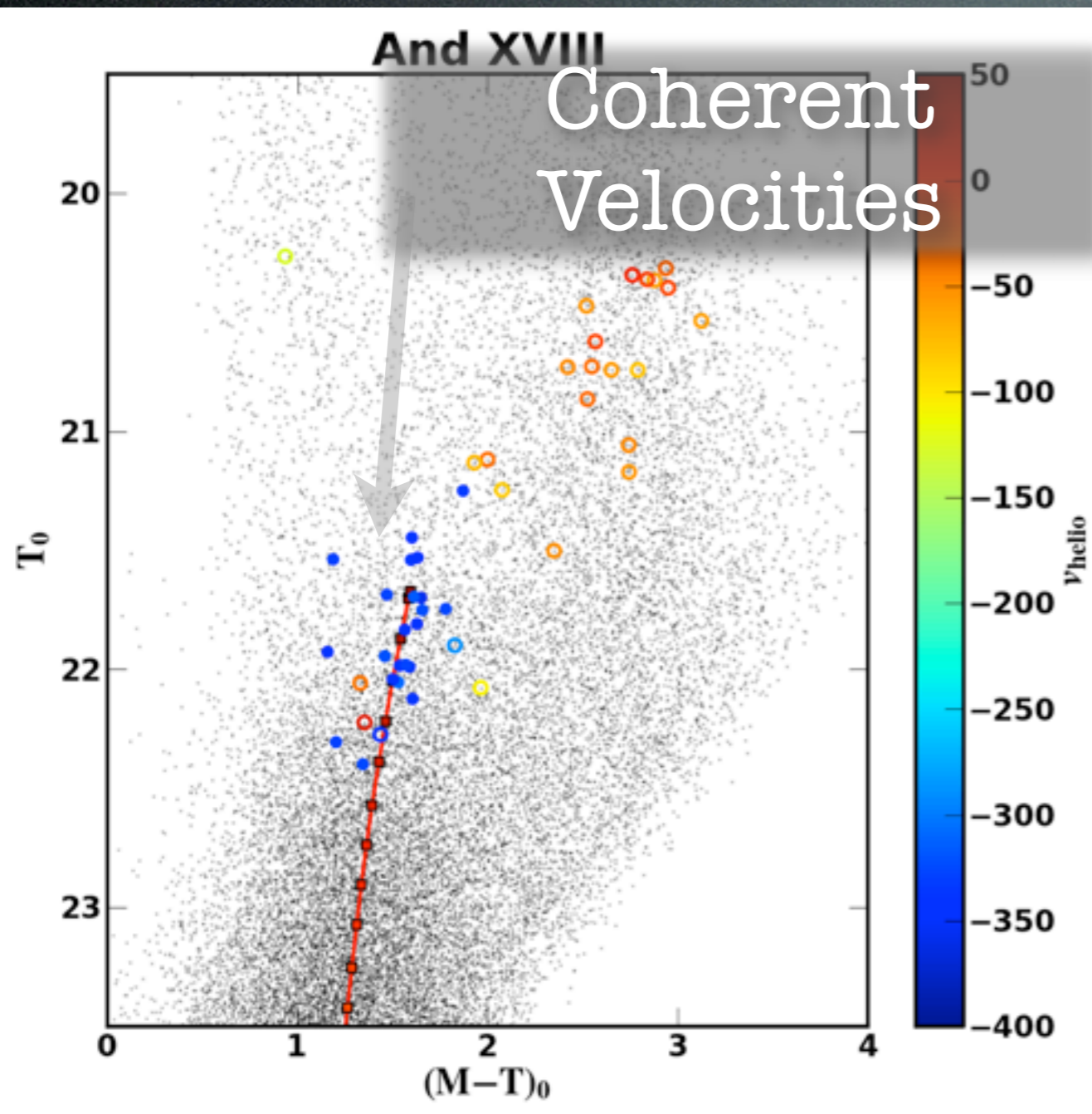
Tollerud+ 11a:

$$M_{1/2} = 3 \frac{\langle \sigma^2 \rangle r_{1/2}}{G}$$
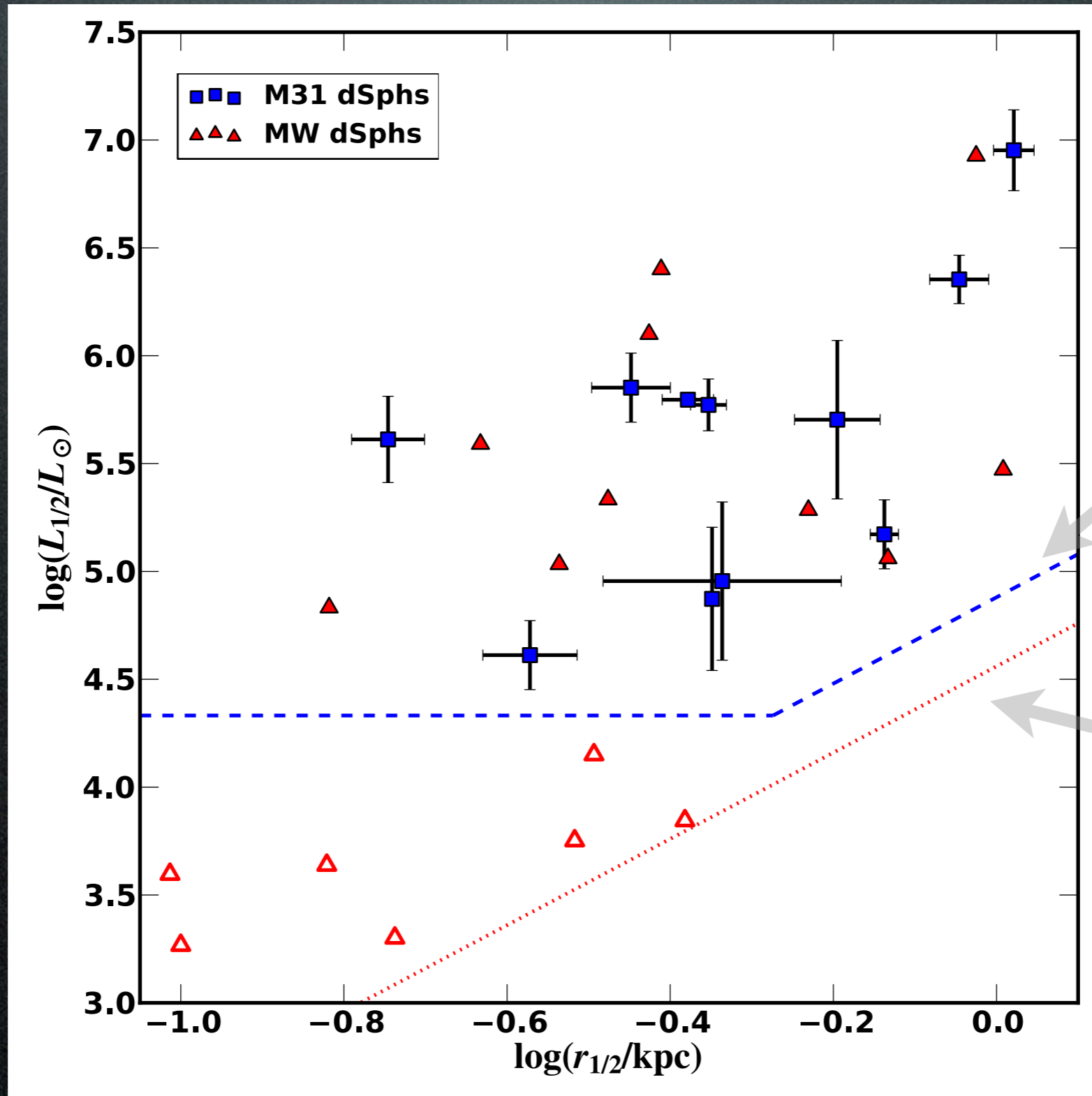
(Wolf+ 10)

$$r_{1/2} = \frac{4 R_{\mathrm{eff}}}{3}$$

$$L_{1/2} = L/2$$

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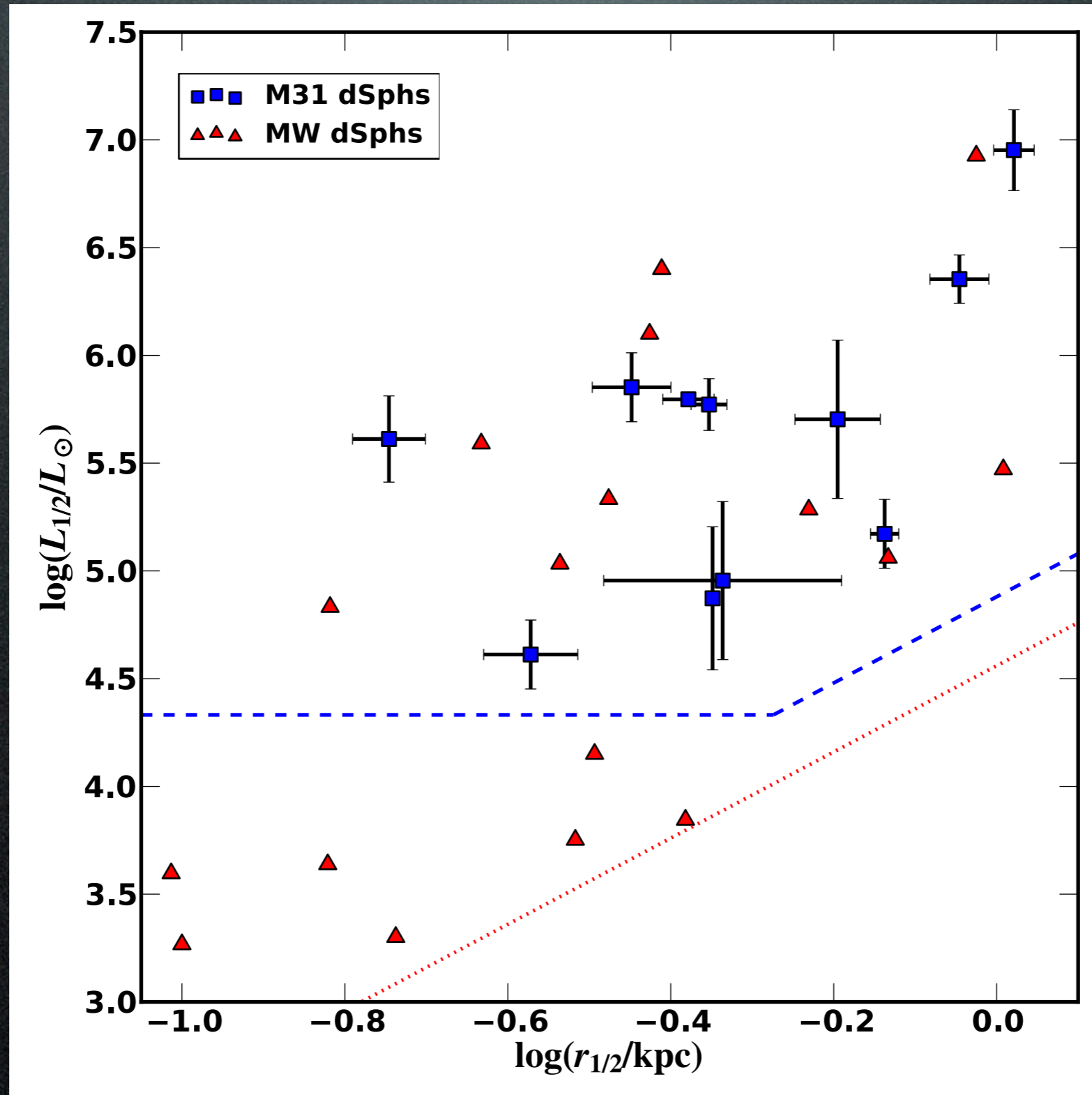
MW vs. M31 (Size-Lum)

MW vs. M31 (Size-Lum)
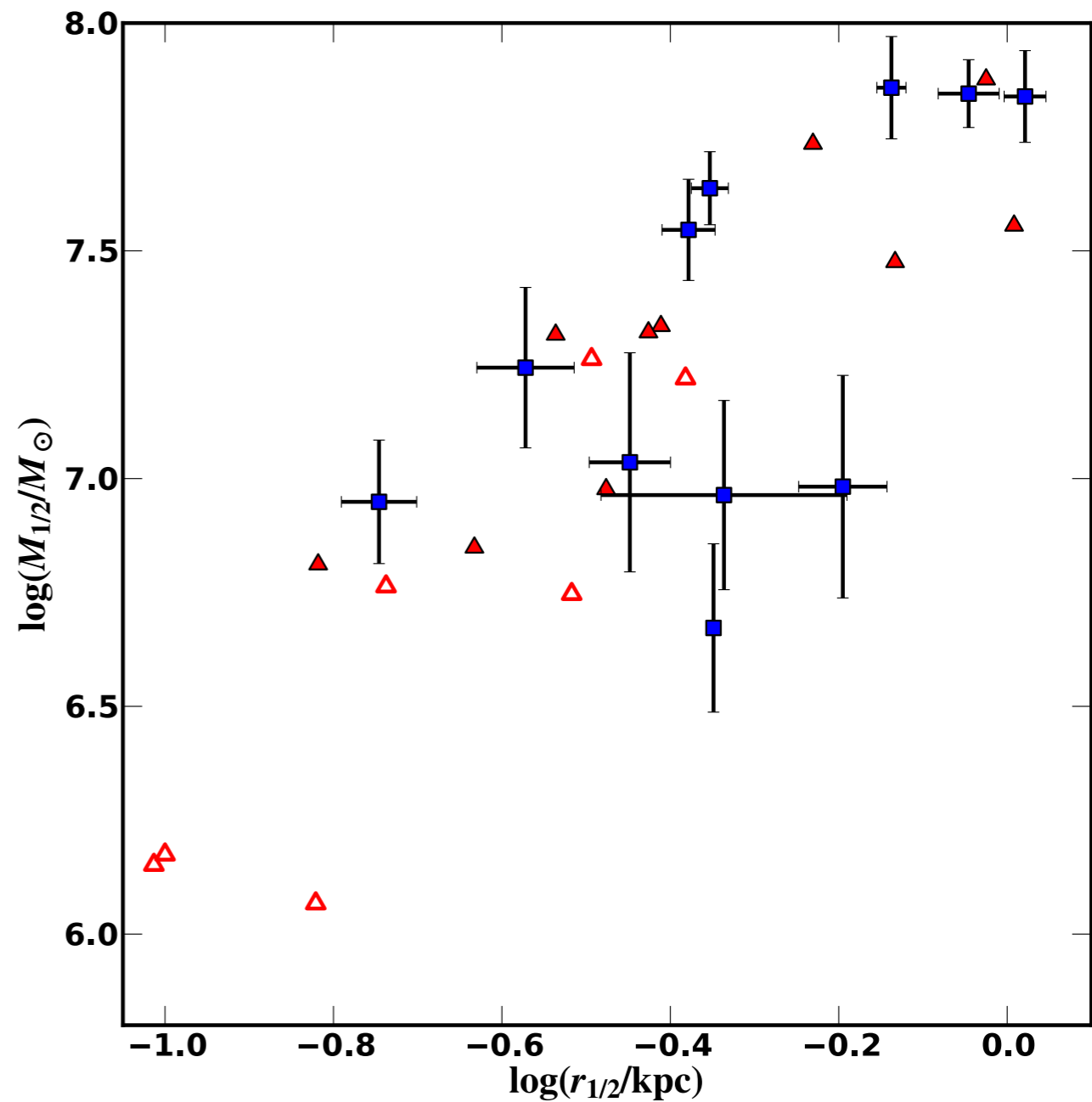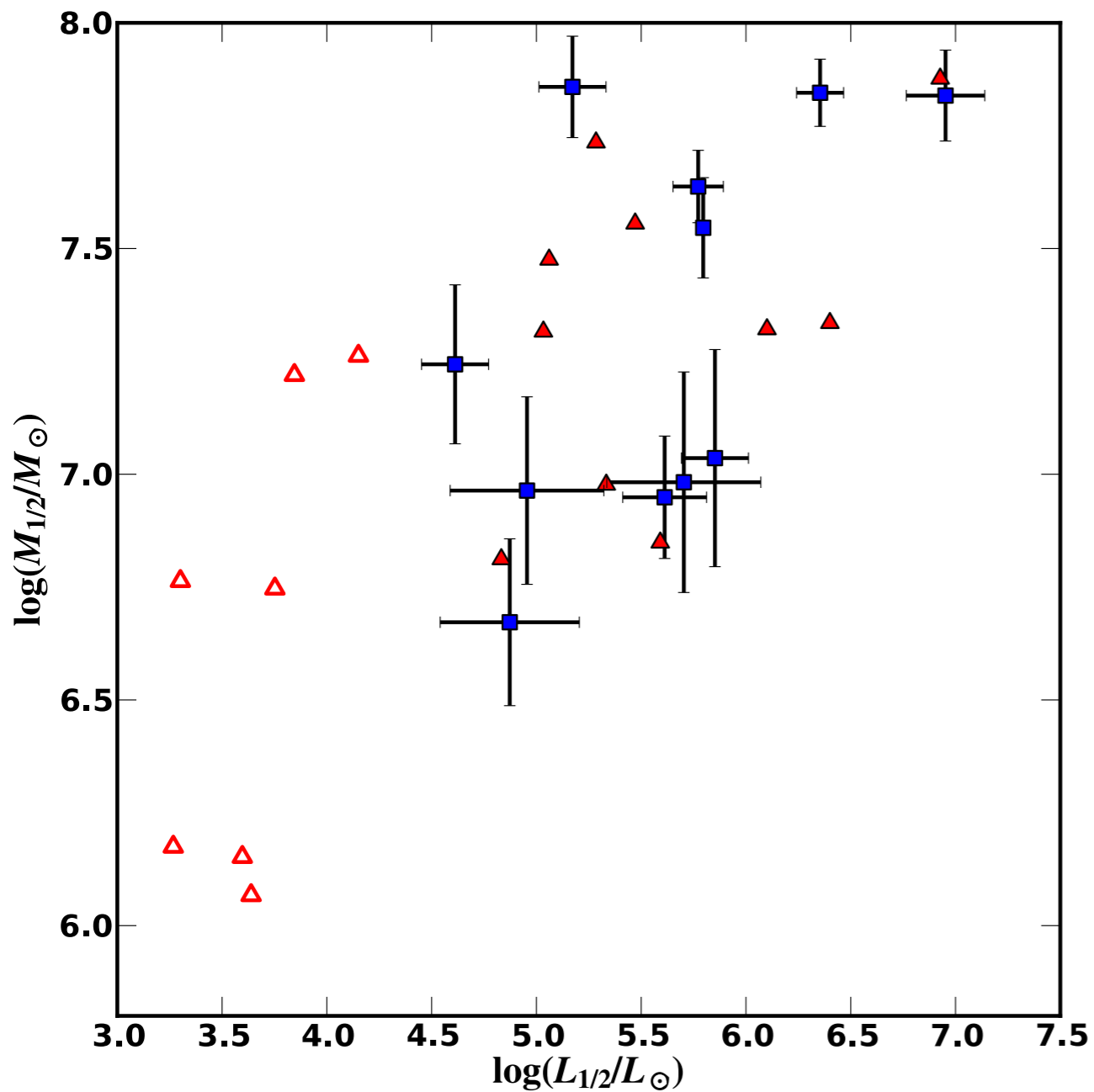
MW vs. M31 (Size-Lum)

MW and M31 are statistically consistent in L-size (Brasseur+ 11)

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MW vs. M31

Legend: M31 dSphs (blue squares), MW dSphs (red triangles)

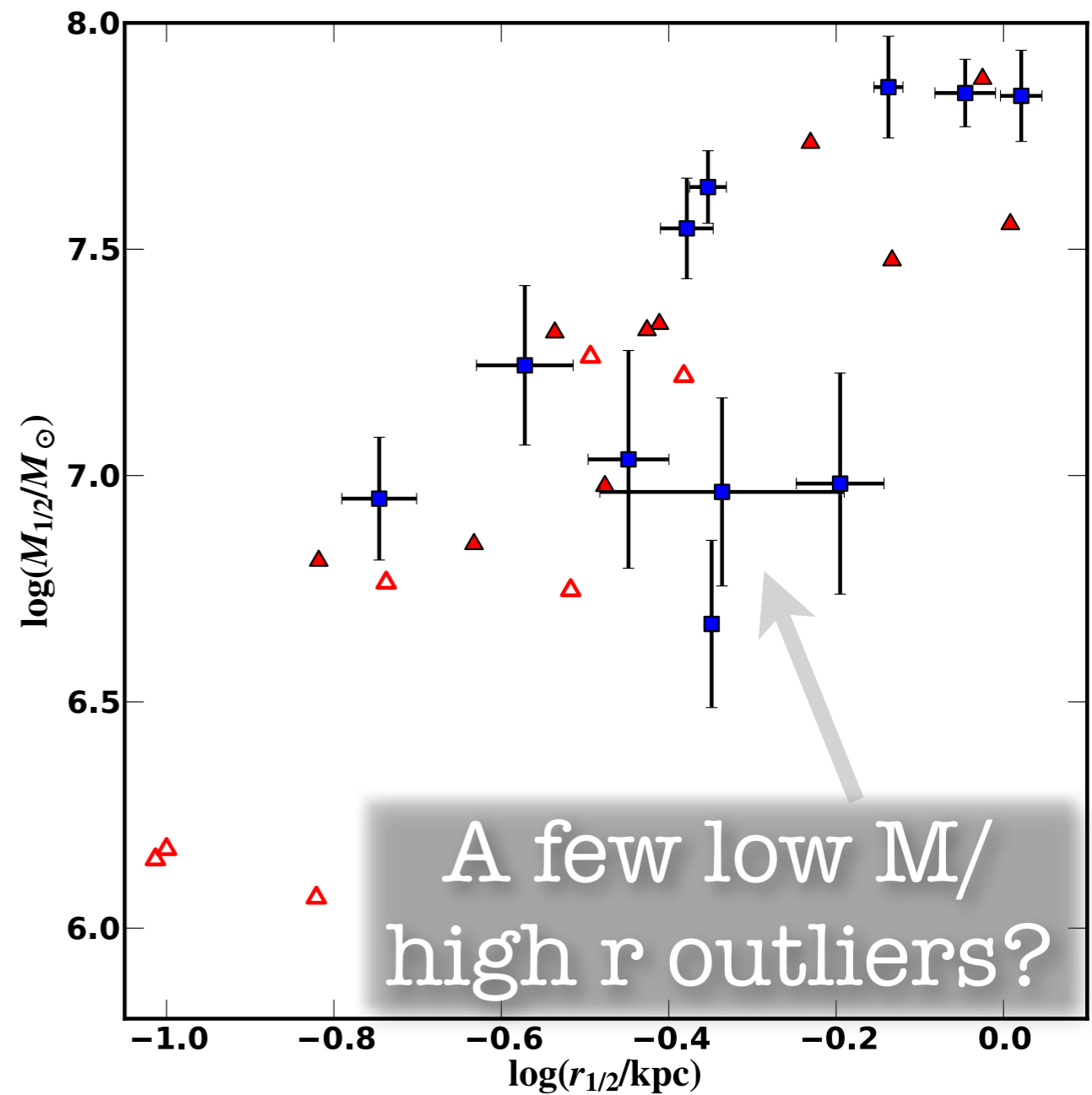# MW vs. M31

MW and M31 overlap in both M-r and M-L
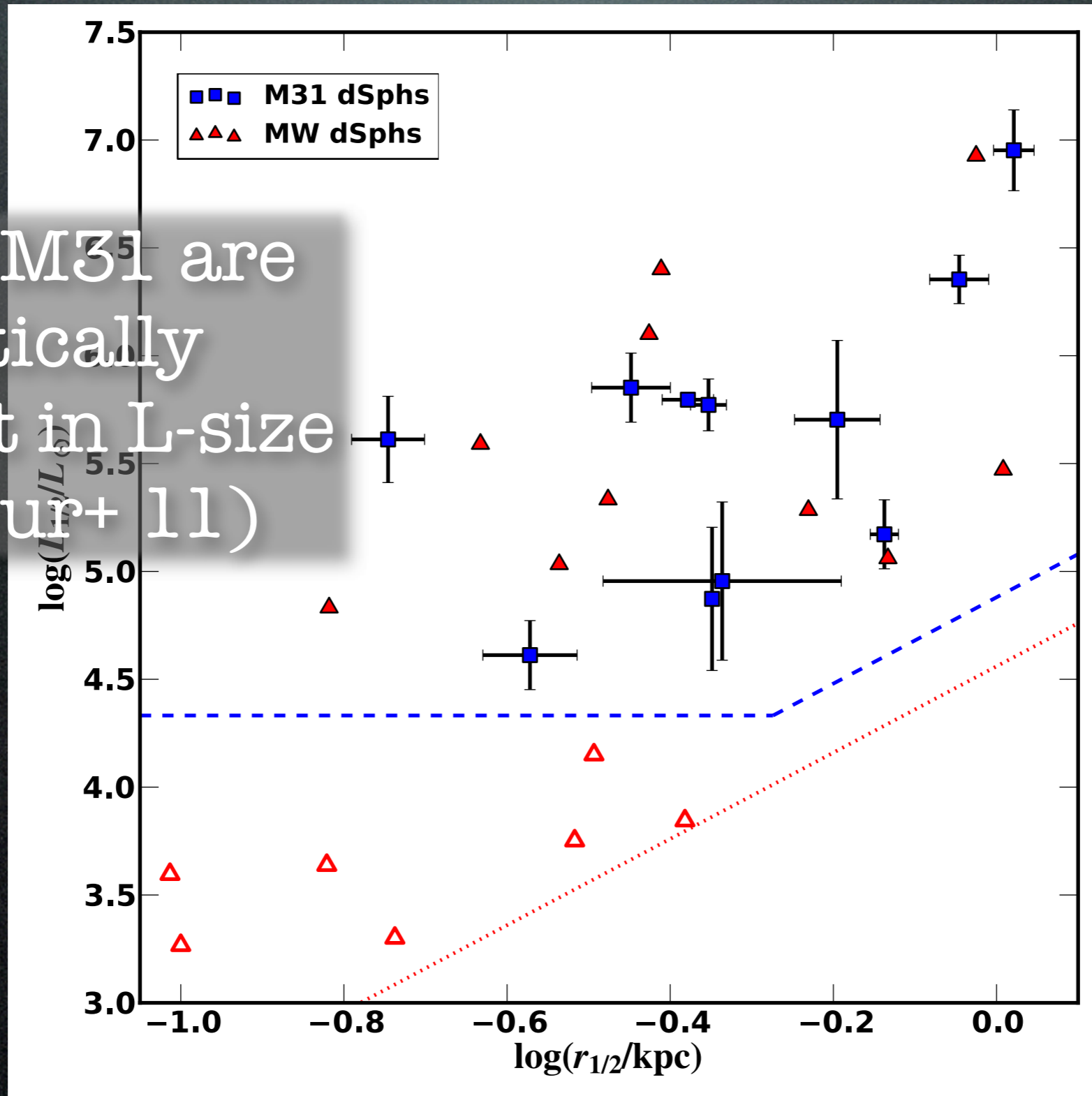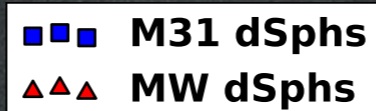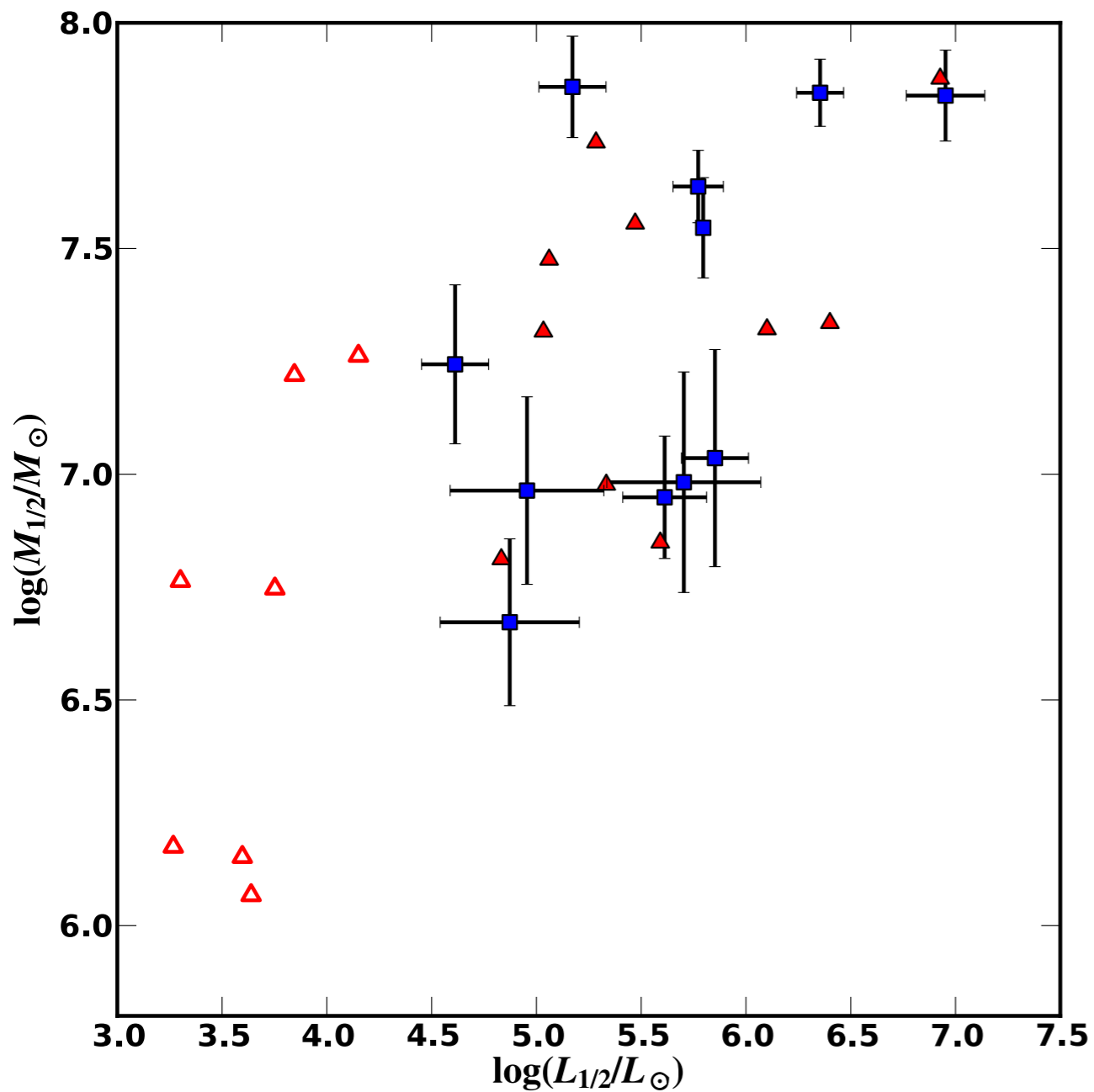
M31 dSphs
MW dSphs

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MW vs. M31

A few low M/ high r outliers?
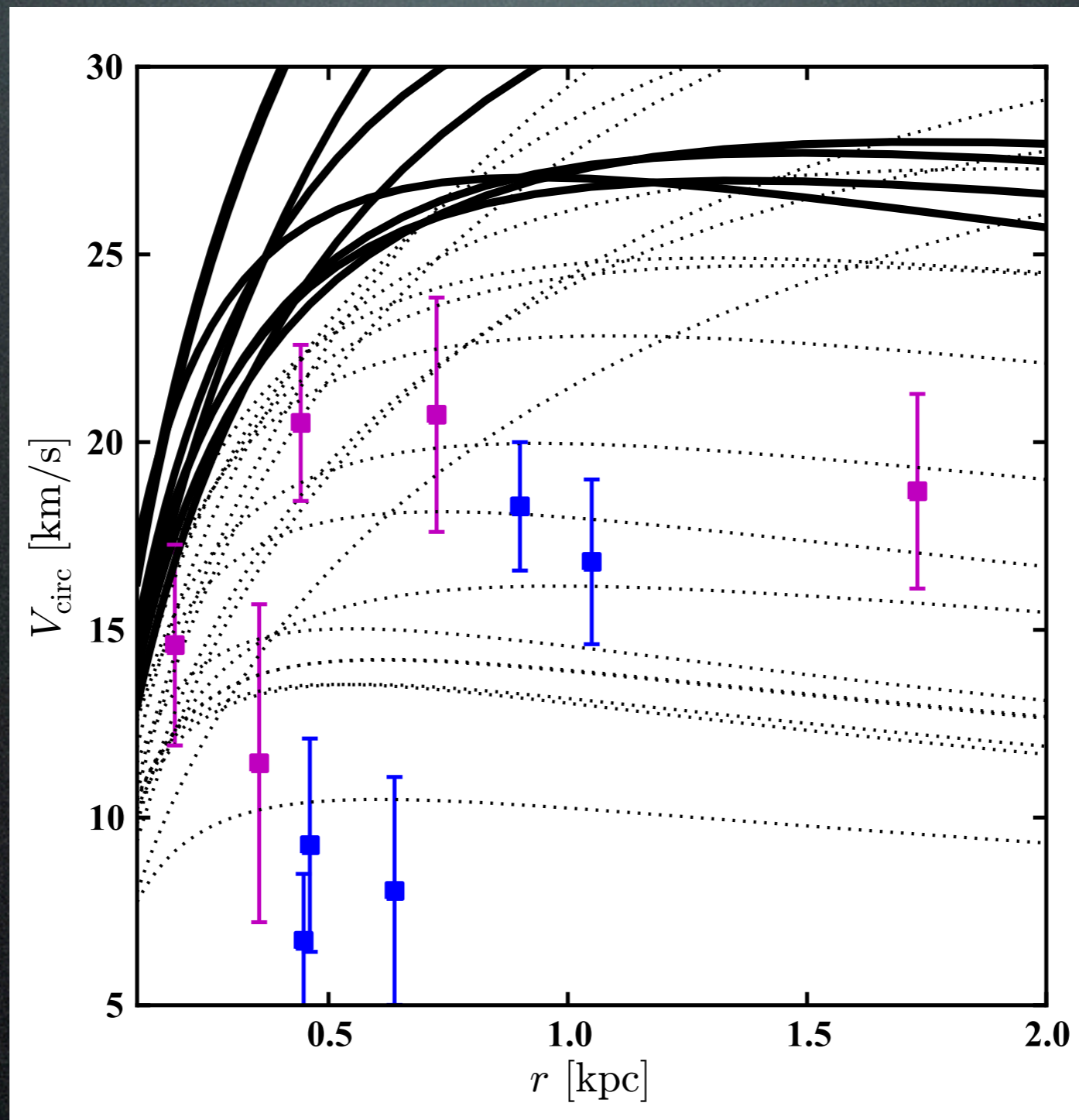
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Massive Failures 2: The Sequel

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Massive Failures 2: The Sequel

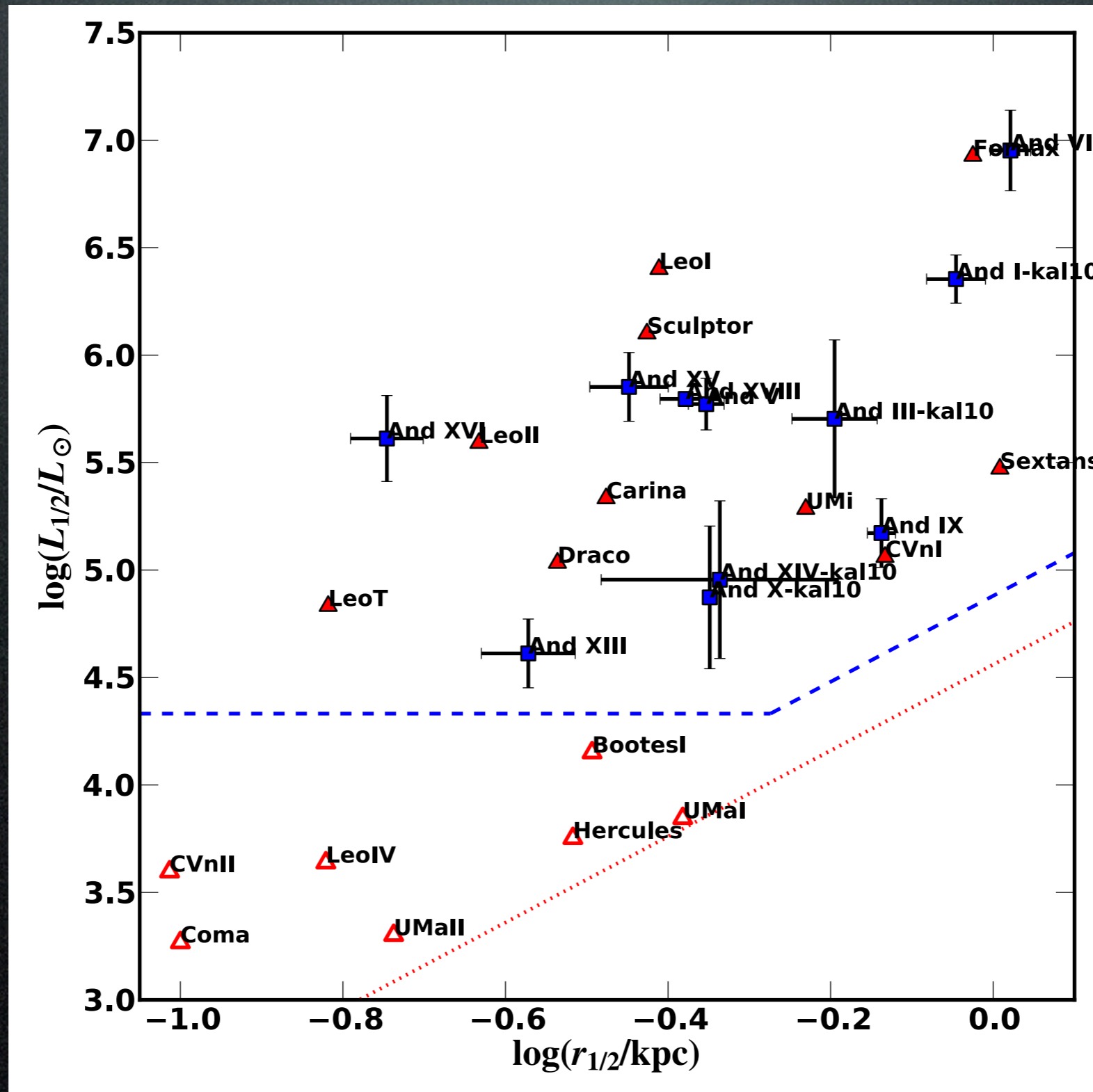Massive Failures Still Missing from M31!

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Conclusions

- M31 dSphs scale much like MW sats: "uniqueness" of MW sats is not a silver bullet for problems.

  - (A few low M/high r outliers?)

  - Is this odd, given different MW/M31 accretion histories/masses?
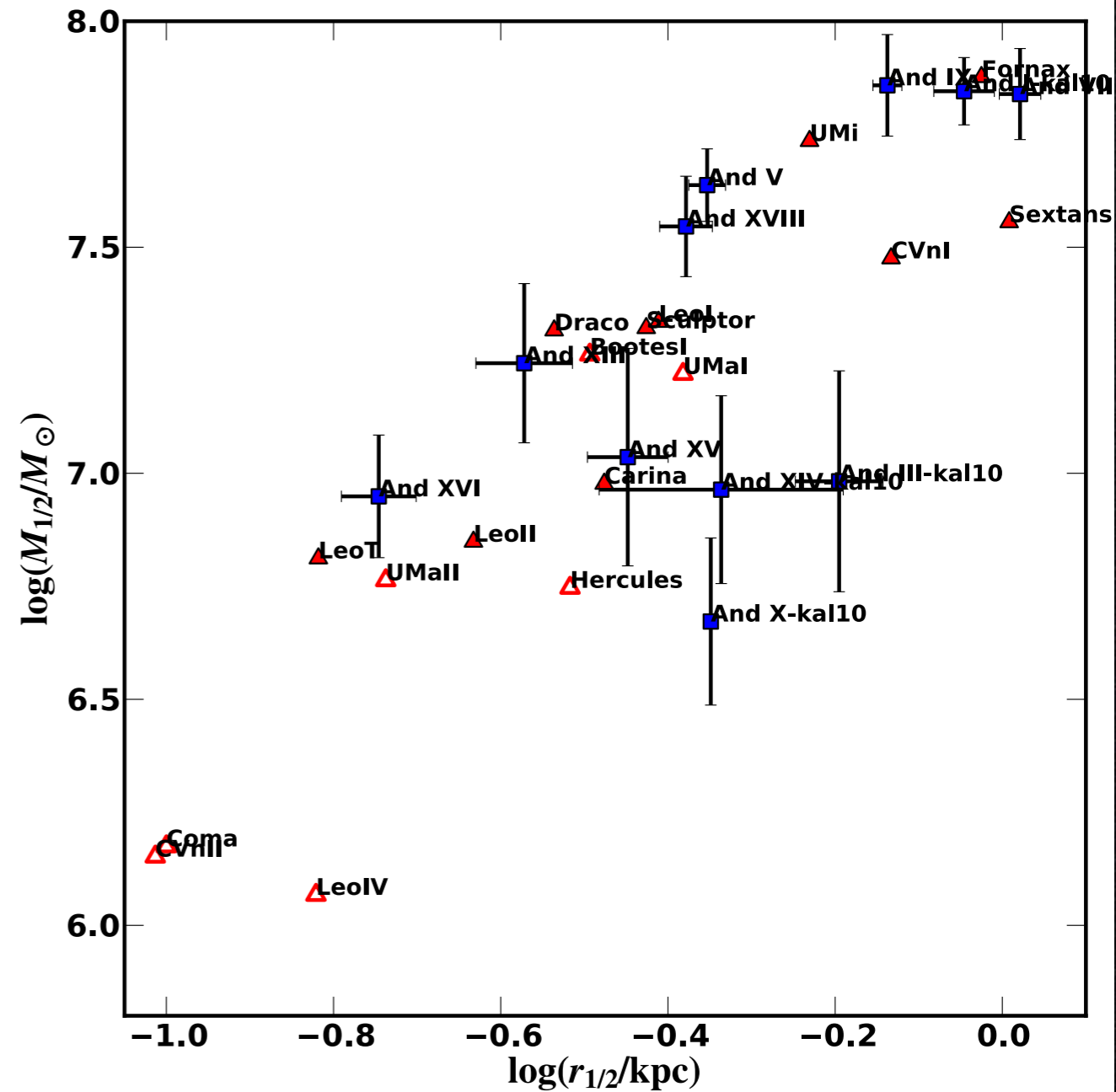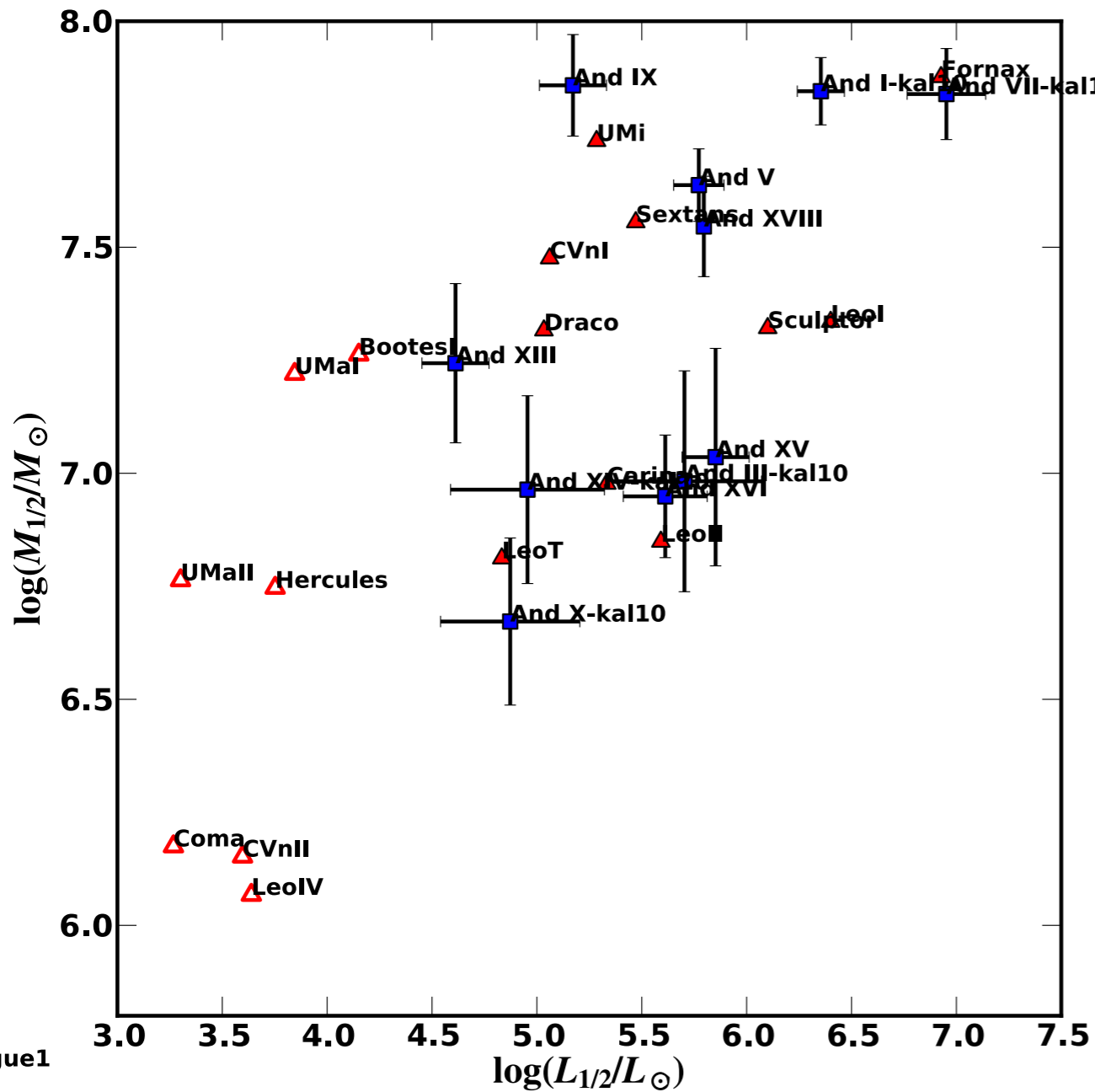
- Massive Failures are still a problem.

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Backup Slides

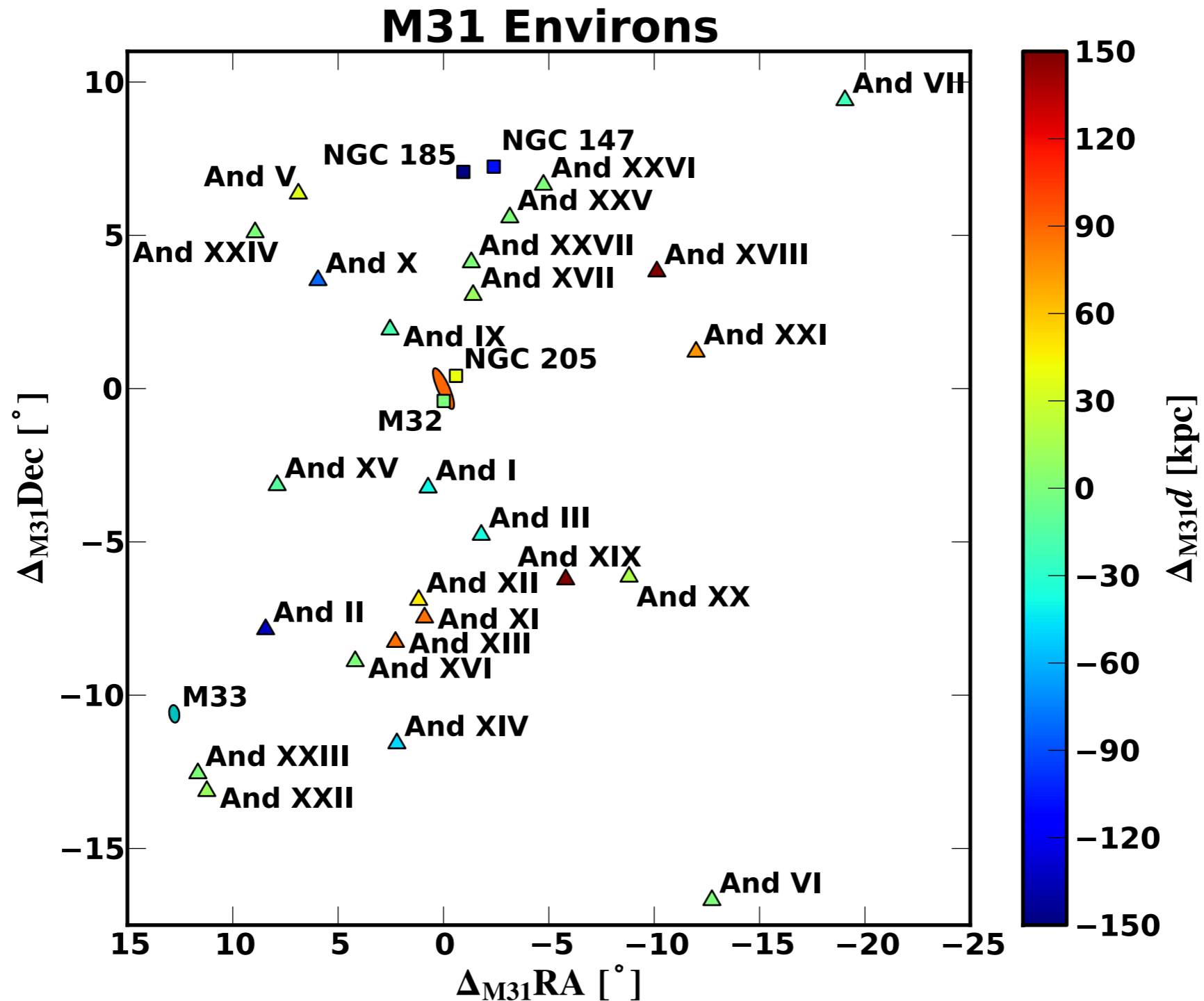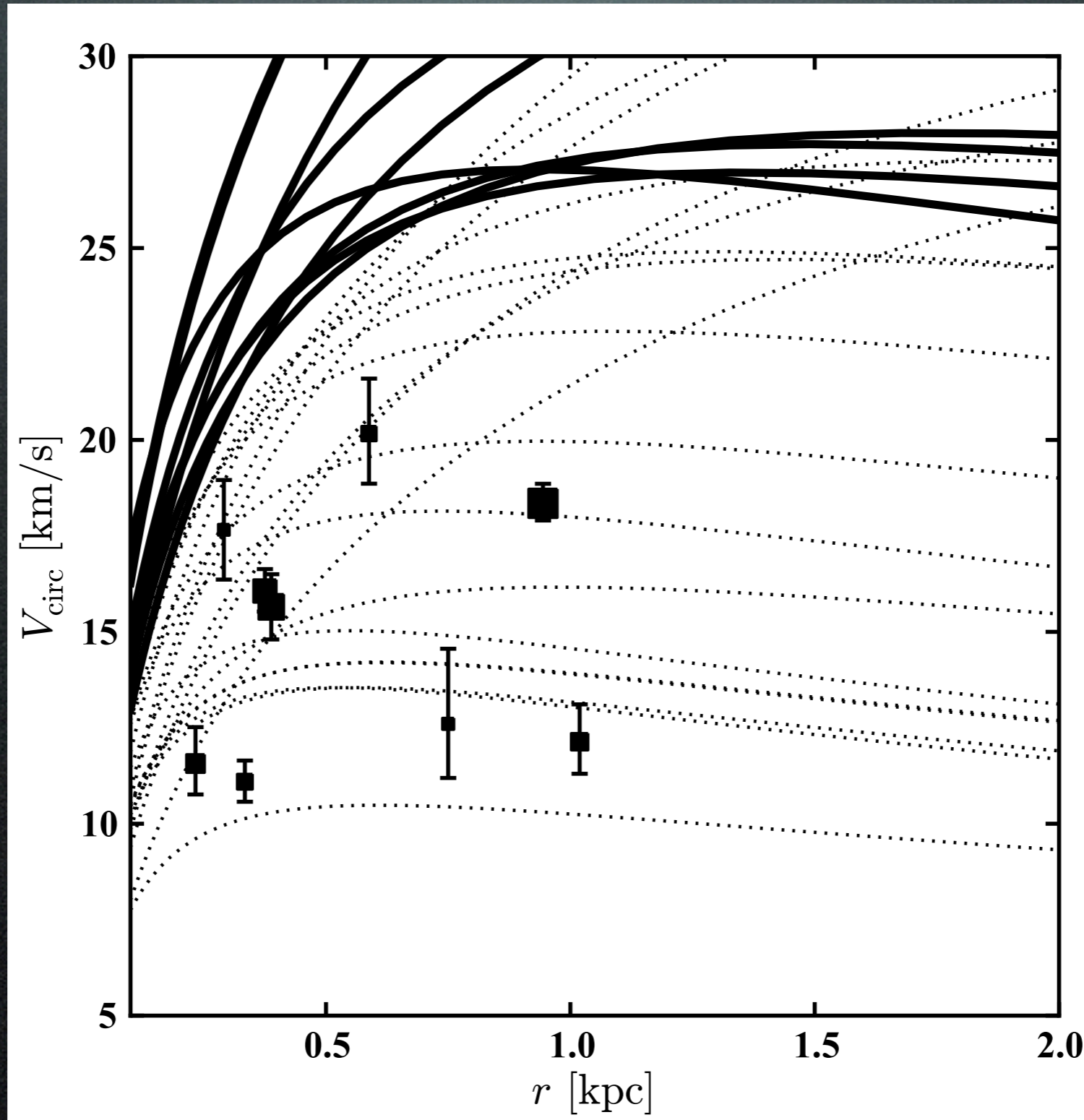Thursday, August 11, 2011
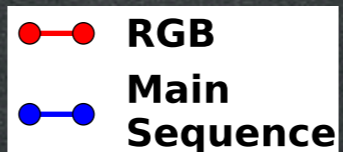
MW vs. M31 w/names
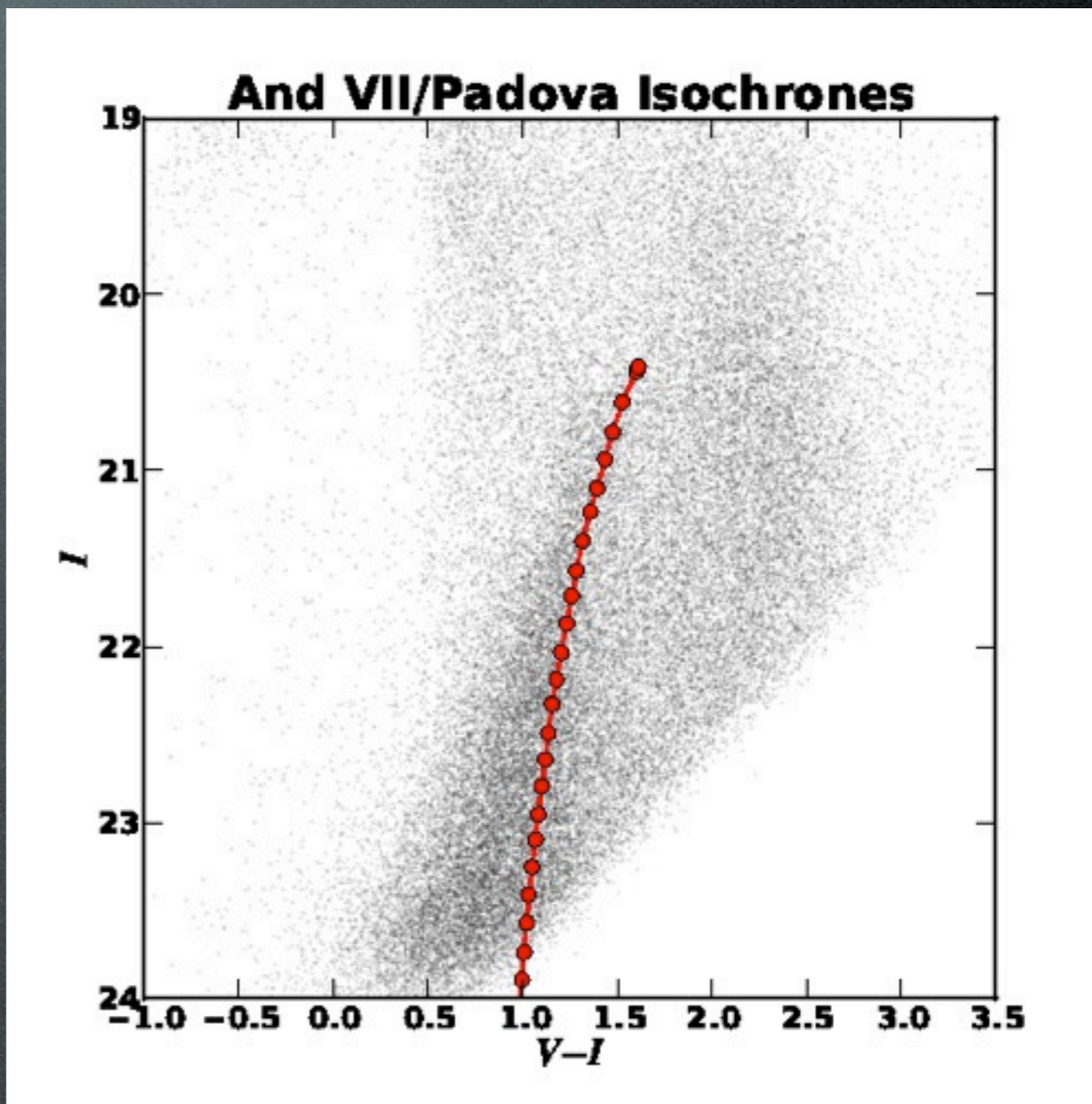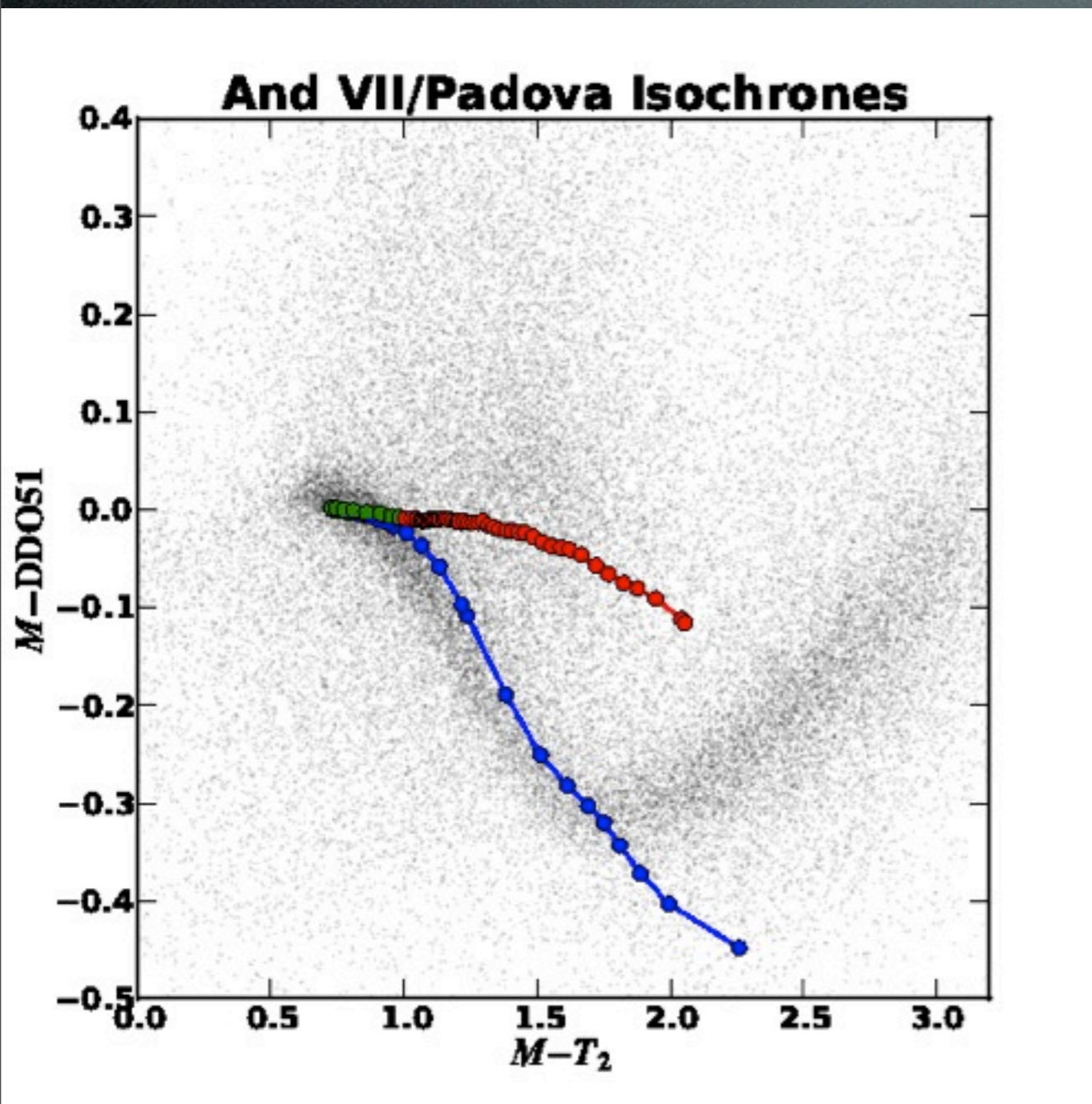
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MW vs. M31 w/names

M31 Sat Distances

Massive Failures in MW

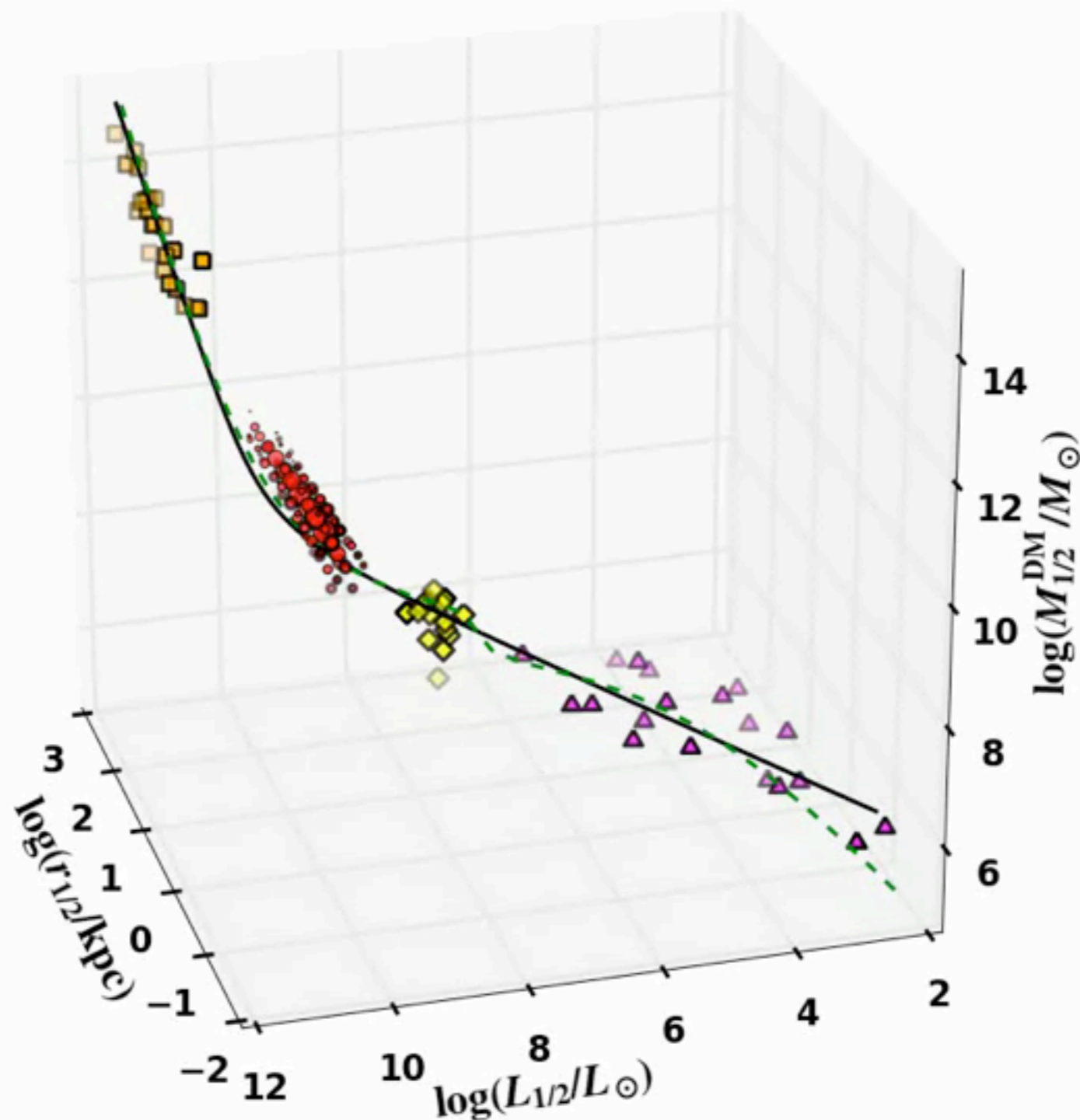# DDO51 Pre-Selection

MRL Space

$$L_{1/2} = L/2$$

$$r_{1/2} = \frac{4R_{\text{eff}}}{3}$$

Wolf+ 10:
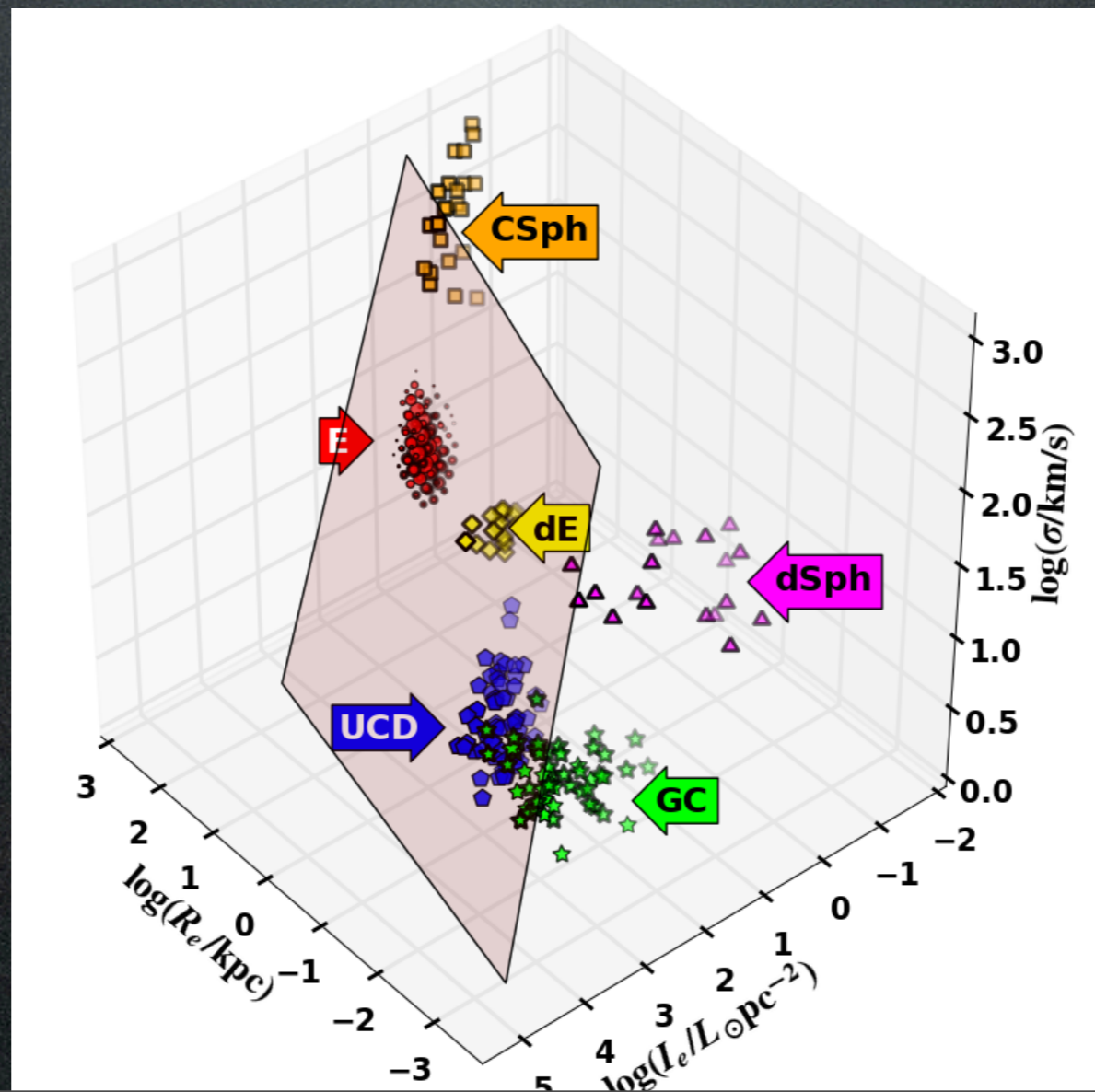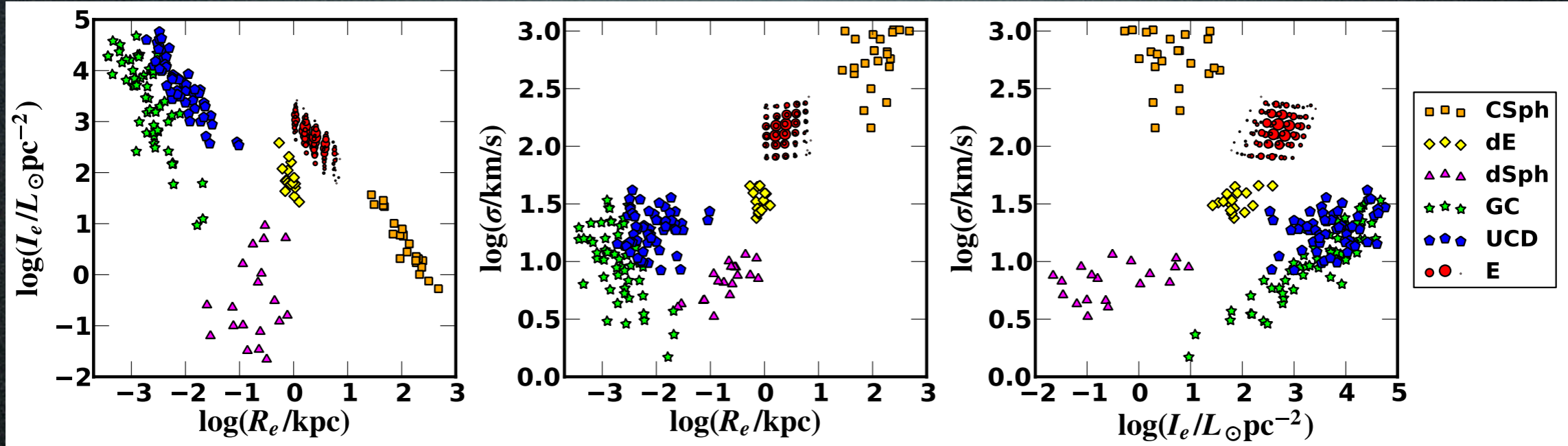
$$M_{1/2} = 3\frac{\langle\sigma^2\rangle r_{1/2}}{G}$$

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MRL Space

Tollerud+ 2011a
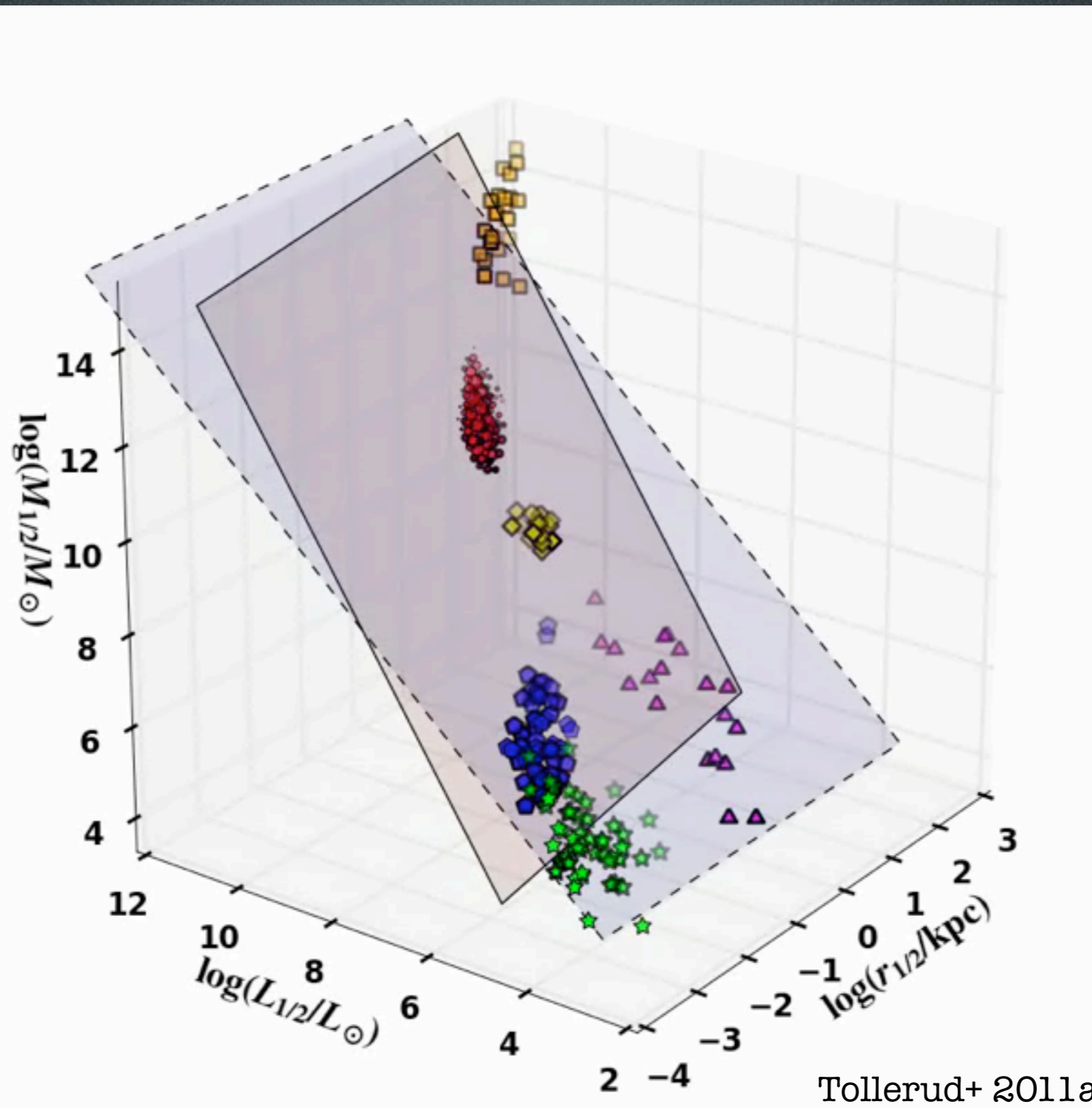
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Fundamental Plane

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