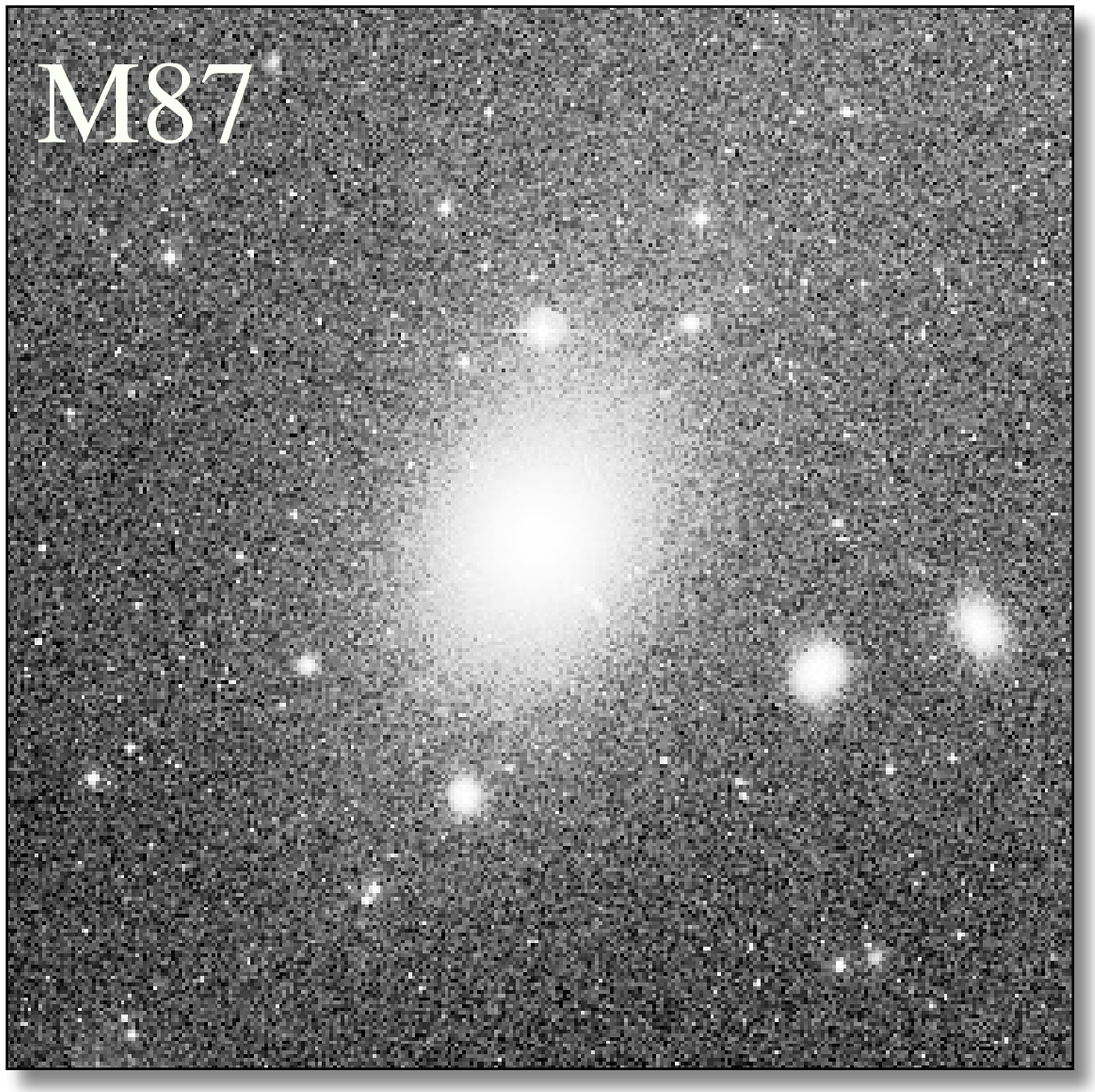
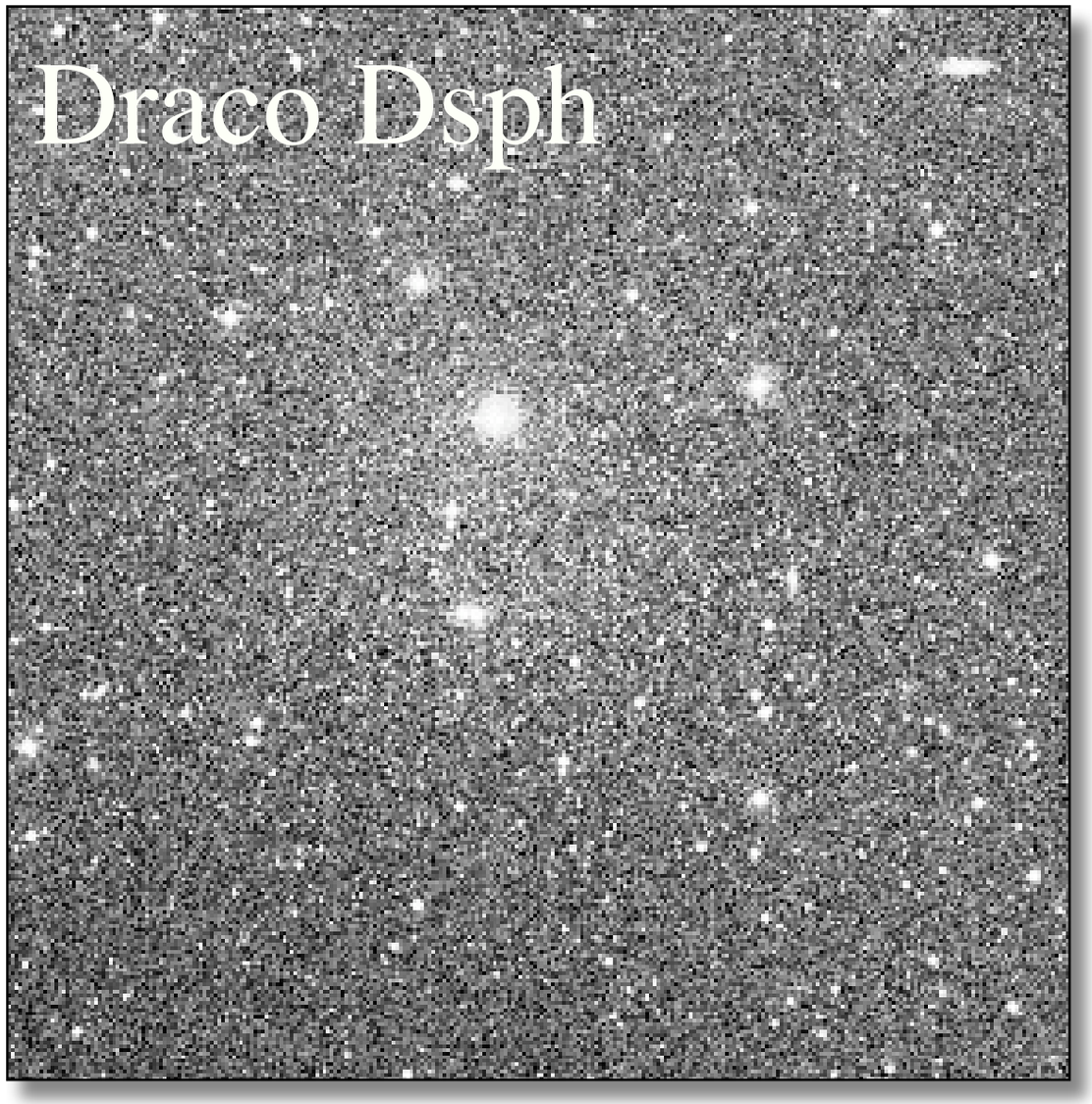
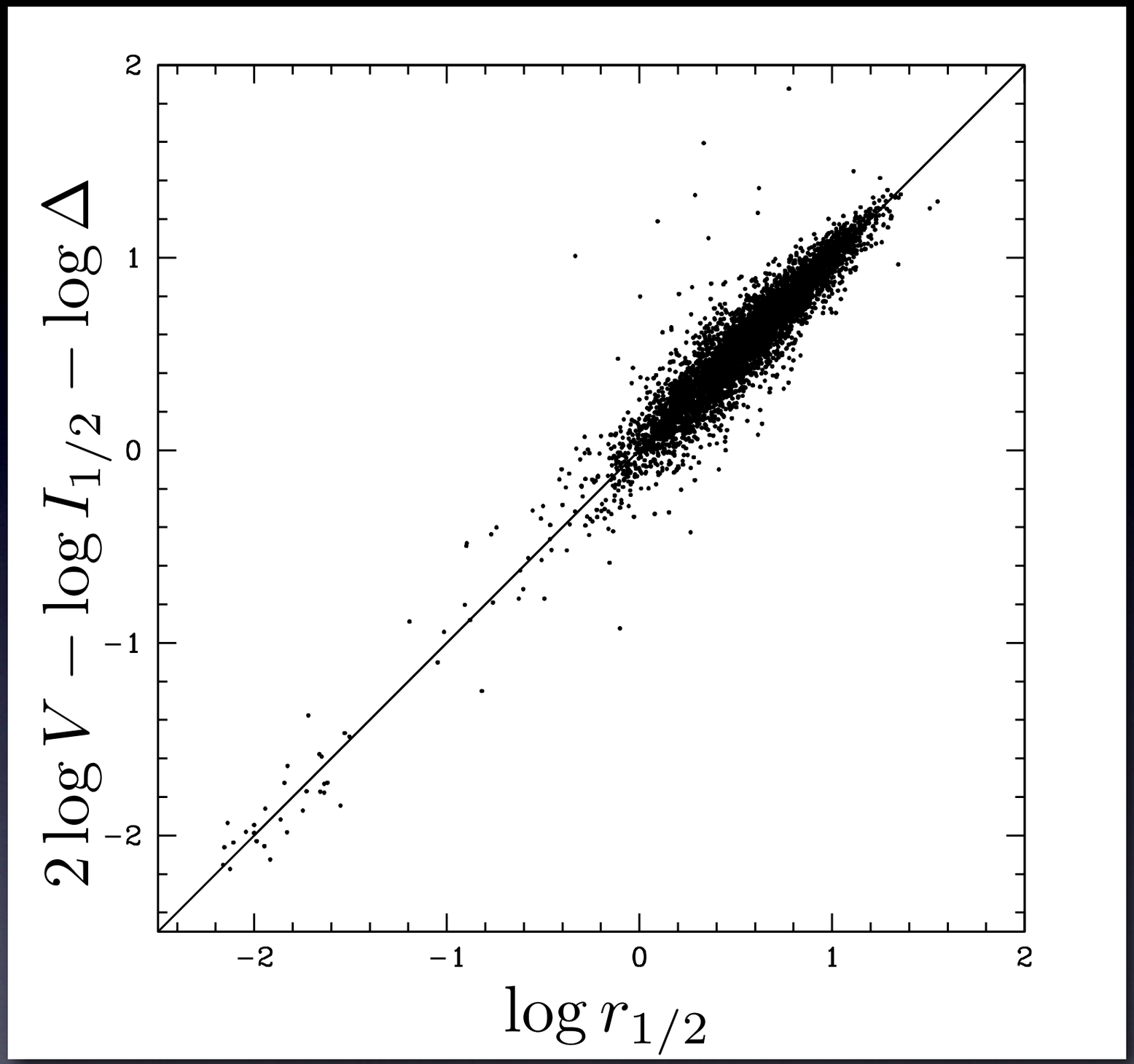
Is the problem of galactic structure tractable?

Dennis Zaritsky (U. Arizona)

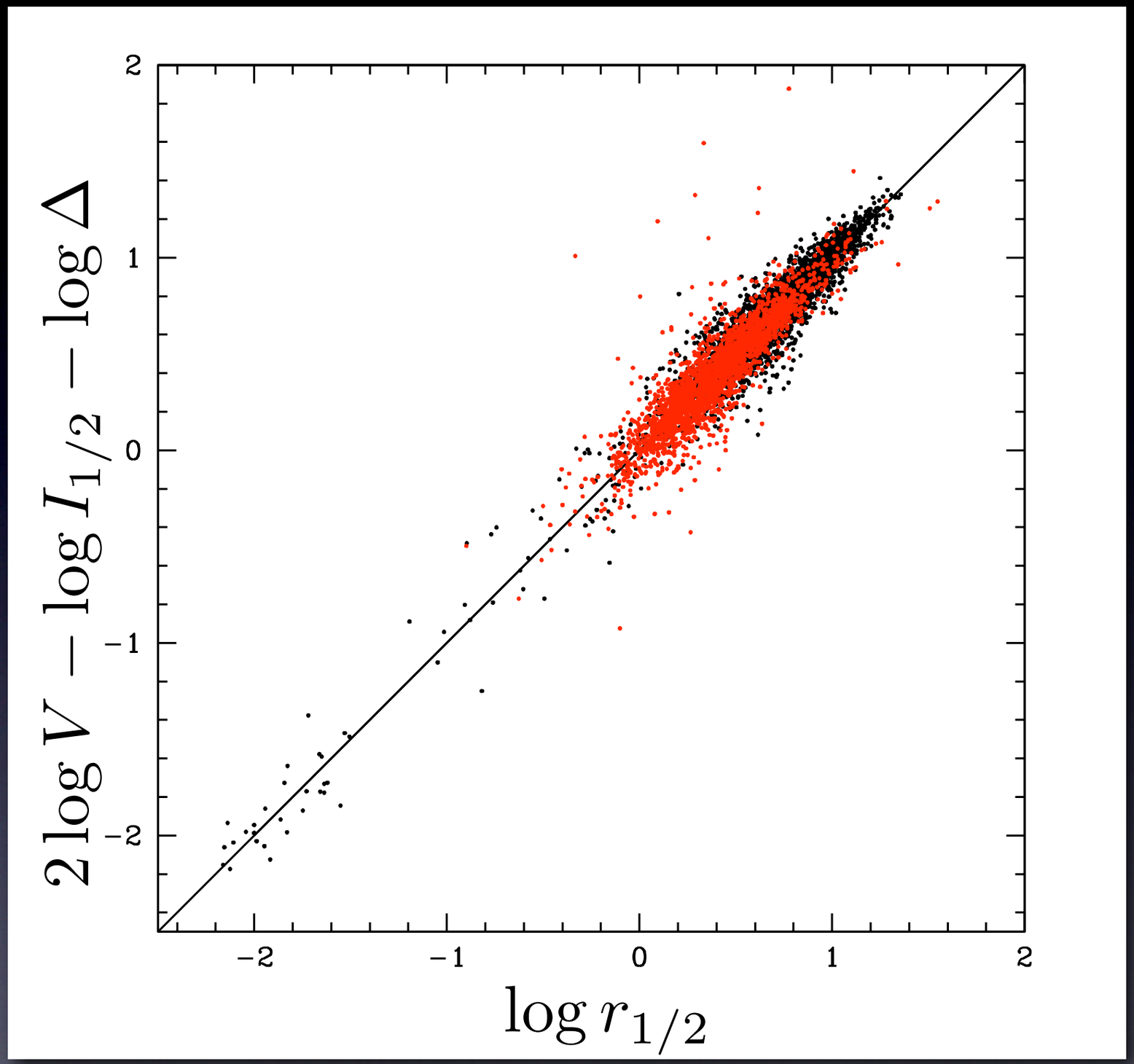




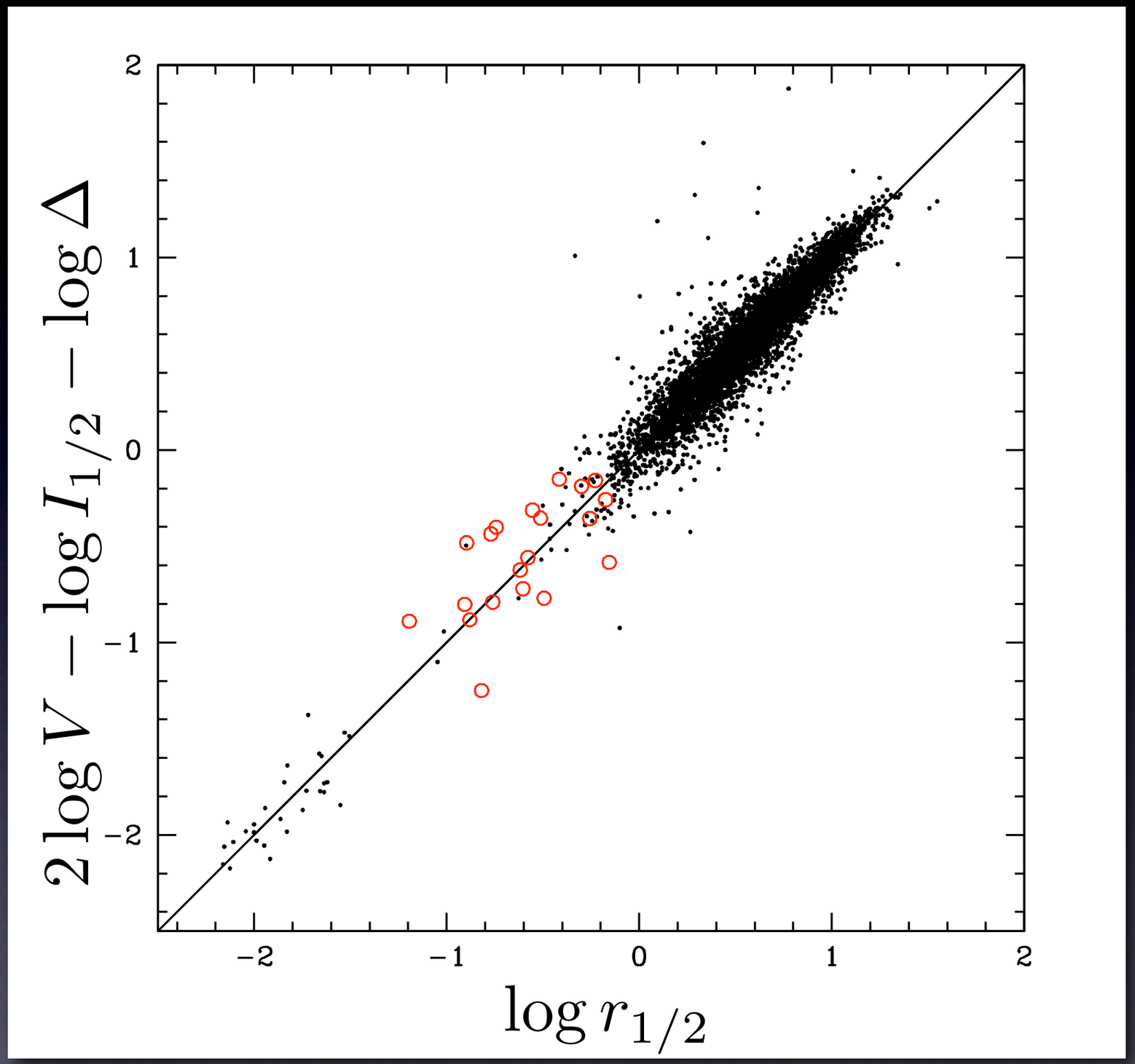
Ann Zabludoff (U. Arizona), Anthony Gonzalez (U. Florida)


2
1
0
−1
−2
−2
−1
0
1
2
$2\log V - \log\Delta$
$\log r_{1/2}$

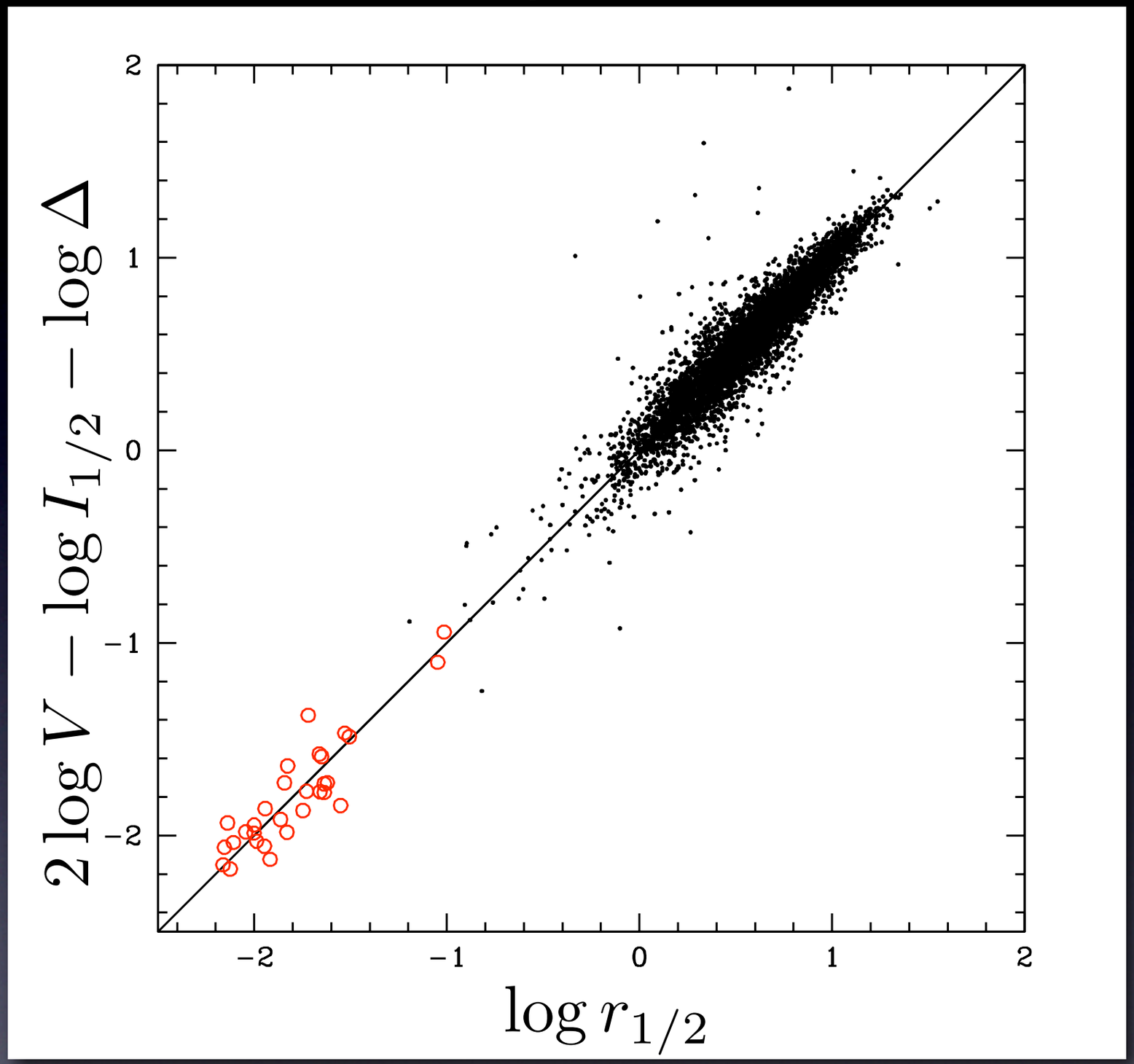
Ellipticals



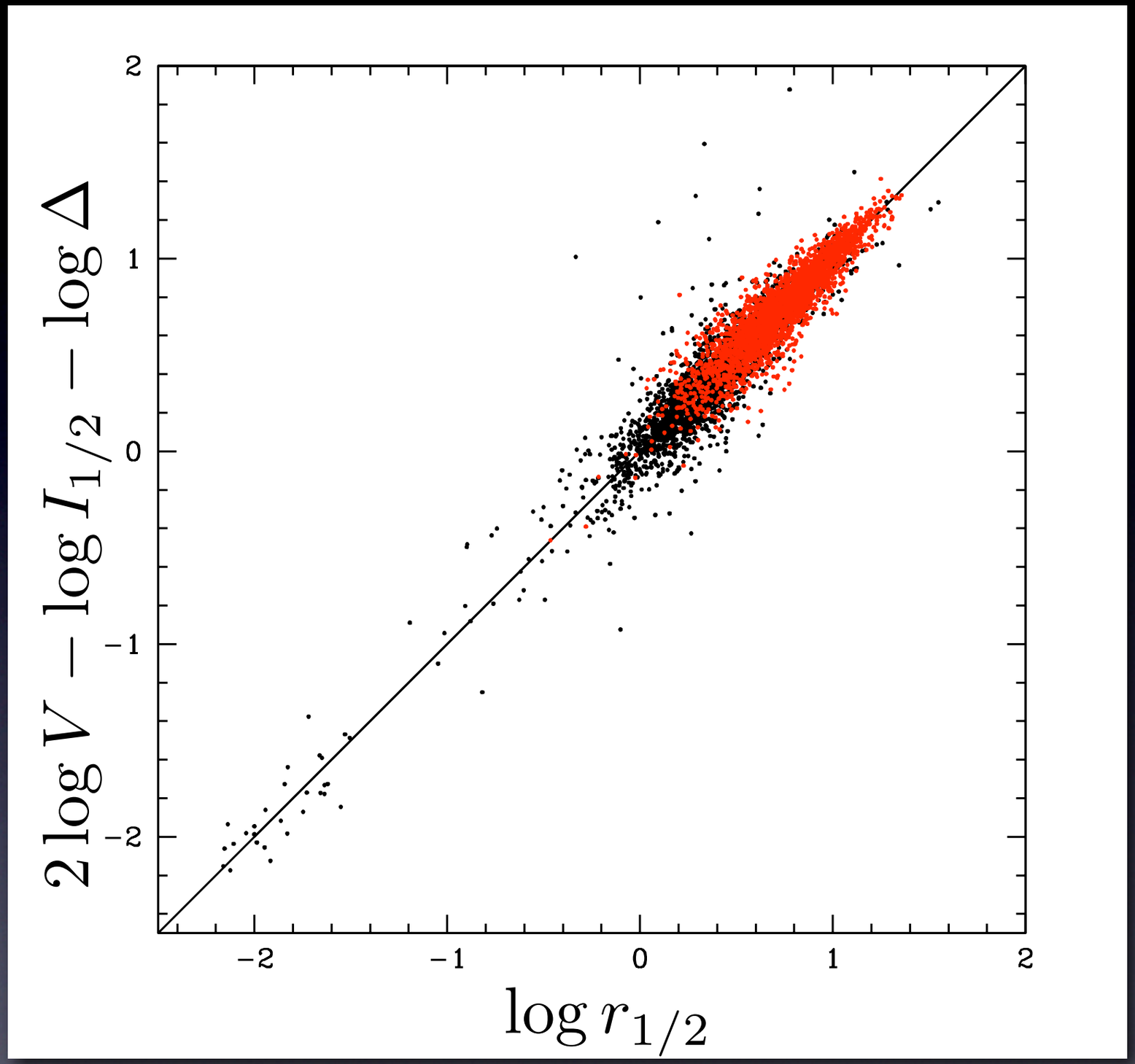
dwarf Spheroidals



Ultracompact dwarfs



Spirals



Back to Basics

$$2T + \Pi + W = 0$$

Tensor Virial Thm

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$\uparrow \equiv V^2$

$$\log r_e = 2\log V - \log I_e - \log(M/L)_e + \log A - \log B + C$$

log's + rewrite

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$\equiv \log \Delta$

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log's + rewrite

One well known attempt...

$$\log \Delta = \beta \log V + \gamma \log I_e + C \qquad (\Delta \propto V^{\beta} I_e^{\gamma})$$

$$\log r_e = (2 + \beta) \log V - (1 + \gamma) \log I_e + C_1$$

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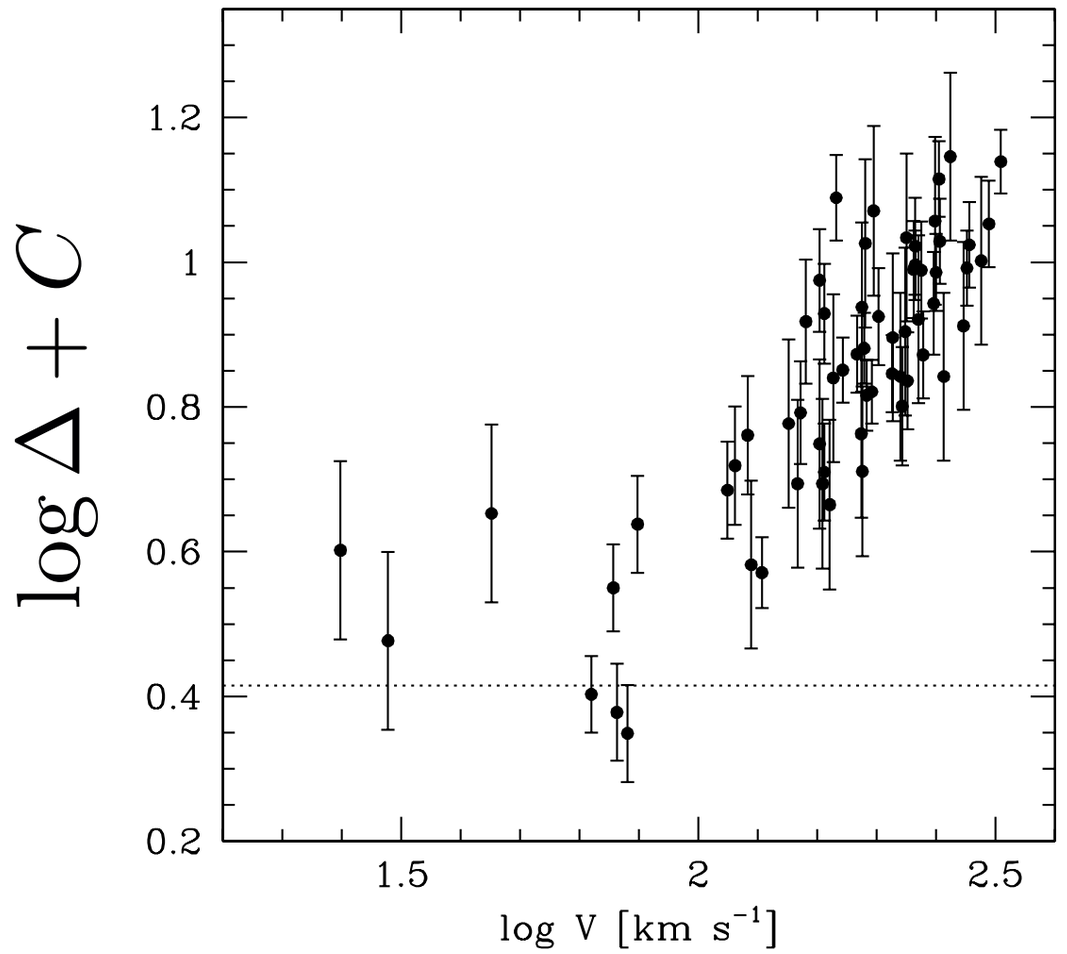
Fundamental “Plane” is curved



data from van der Marel & van Dokkum (2007)

Applications & Implications of the FM

- $\log \Delta = \log M/L + C$ $\qquad\qquad$ $(\Delta = f(V, I_e))$

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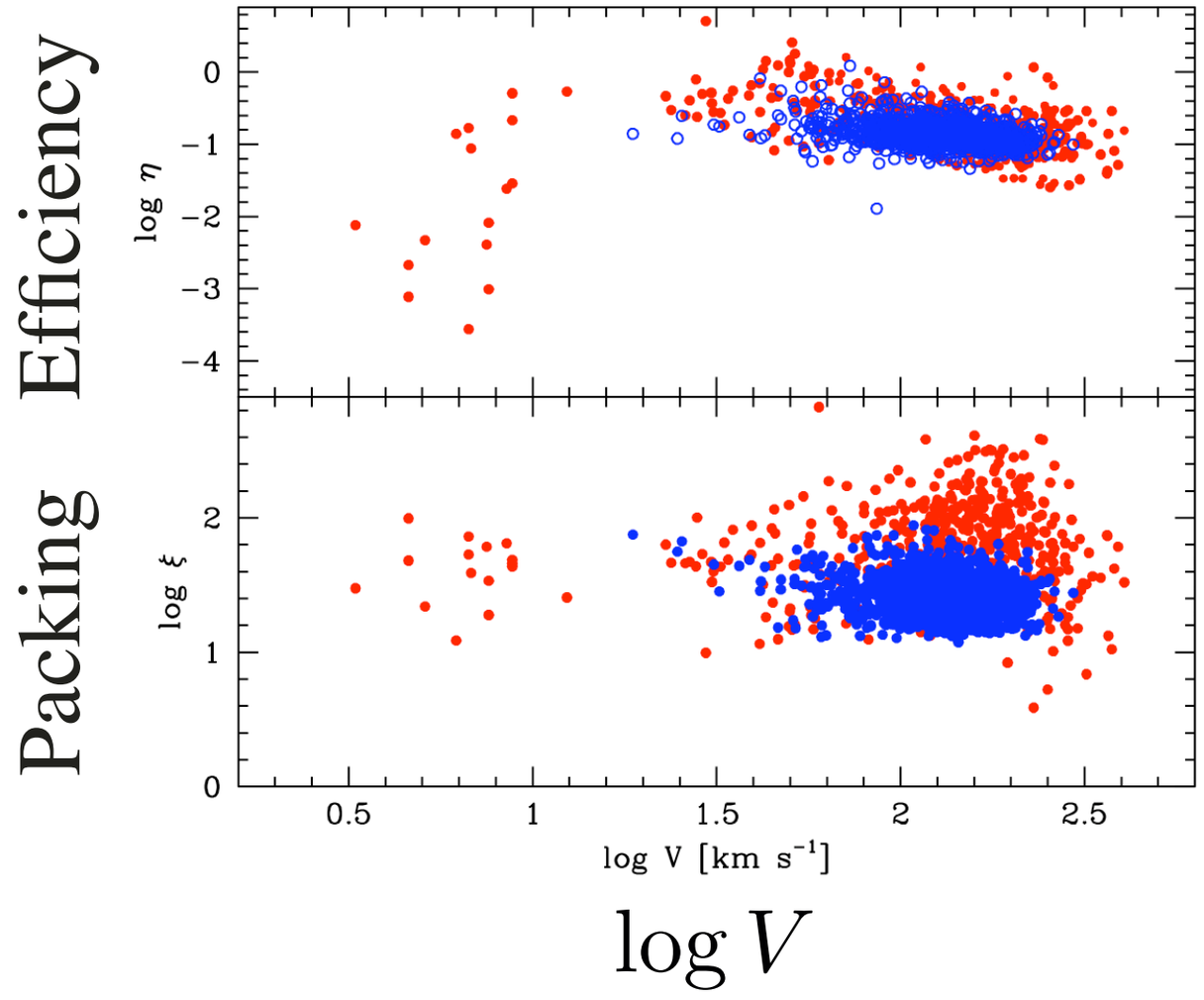

Applications & Implications of the FM

- $\log \Delta = \log M/L + C$

- M/L must be driven by primarily two parameters

- low scatter ($\sim$ 0.1 dex) implies galaxies settle well and exclude exotic (or highly stochastic processes)

A SINGLE RELATIONSHIP EXPLAINS THE STRUCTURE OF ALL GALAXIES*