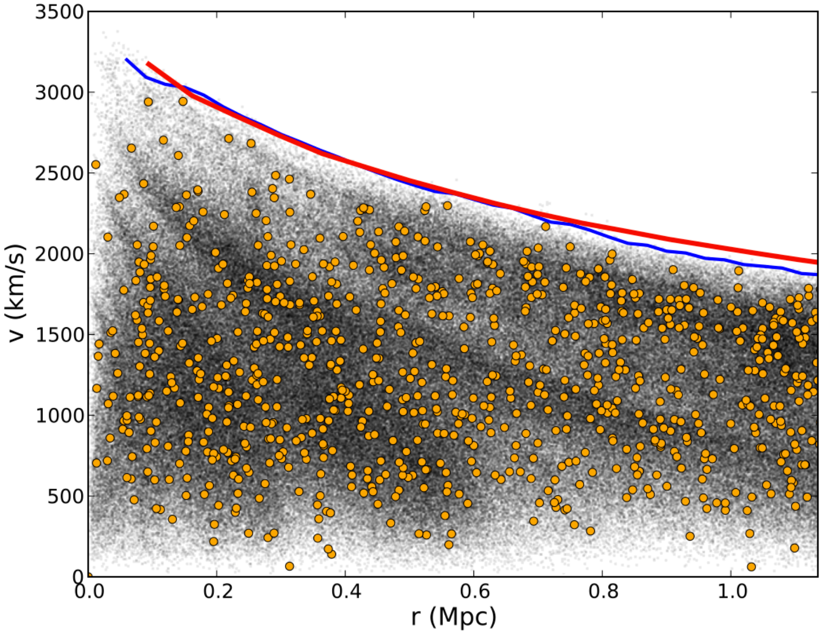
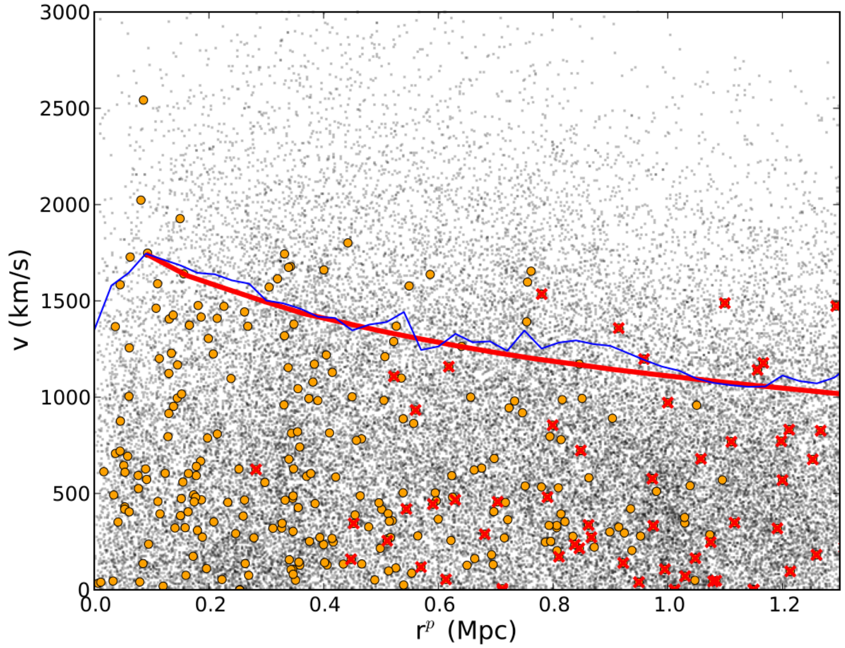
THE CAUSTIC TECHNIQUE

Daniel Gifford, Christopher Miller, and Nicholas Kern

Dynamical Masses (Caustic Technique)





$$GM(<R) = \int_0^R \hat{\mathcal{F}}(r) v_{esc}^2(r) dr$$

Revising the Caustic Technique

- Calibrated via simulations
- Would like to be dependent on observables

$$GM(< R) = \int_0^R \boxed{\mathcal{F}_\beta(r)} \langle v^2_{los,esc} \rangle (r) dr$$

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$$-2\pi G \frac{\rho(r) r^2}{\Phi(r)} \frac{(1-\beta(r))}{(3-2\beta(r))}$$

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$$\downarrow$$

$$-2\pi G \frac{\rho(r) r^2}{\Phi(r)} \frac{(1-\beta(r))}{(3-2\beta(r))}$$

$$\downarrow$$

$$\frac{(r/r_0)^2}{(1+r/r_0)^2 \ln(1+r/r_0)} \frac{(1-\beta(r))}{(3-2\beta(r))}$$

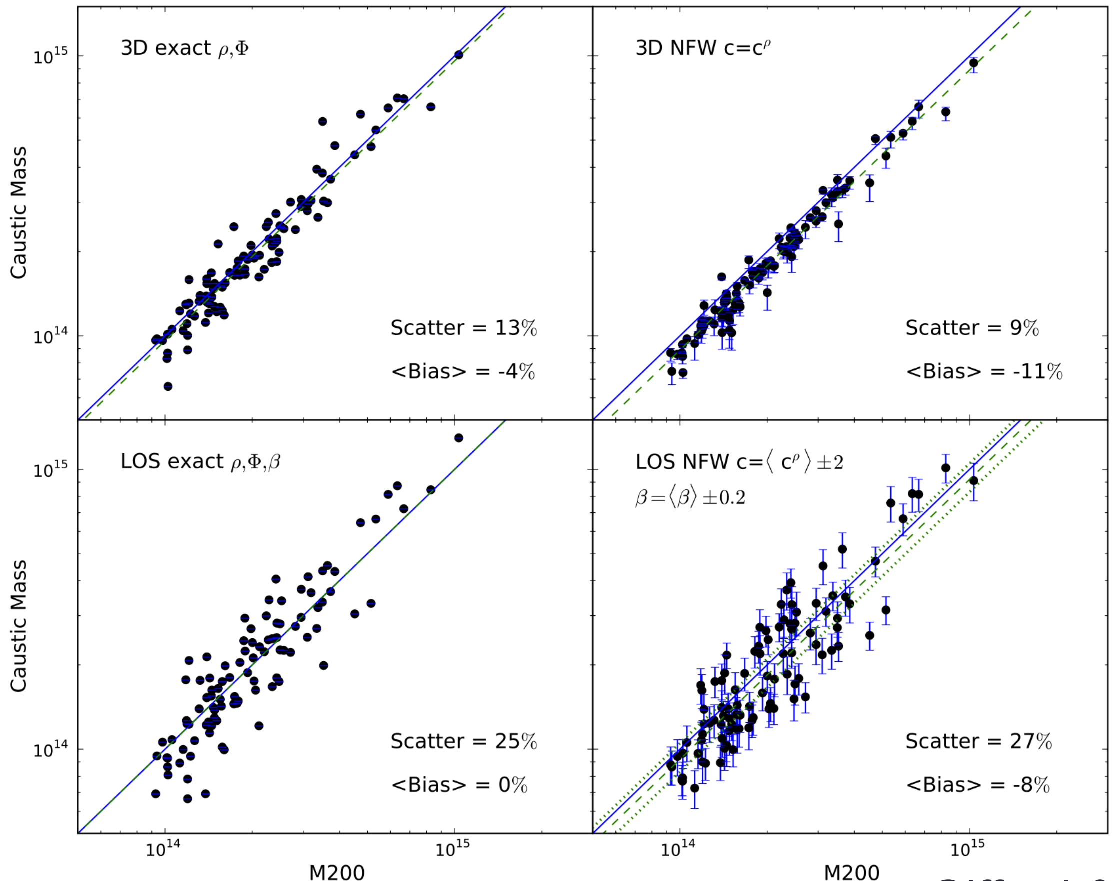
Revising the Caustic Technique

$$GM(<R) = \int_0^R \hat{\mathcal{F}}(r) v_{esc}^2(r) dr$$

$$\mathcal{F}(r) = -2\pi G \frac{\rho(r) r^2}{\Phi(r)} \qquad \hat{\mathcal{F}}(r) = \frac{(r/r_0)^2}{(1+r/r_0)^2 \ln(1+r/r_0)}$$

3D

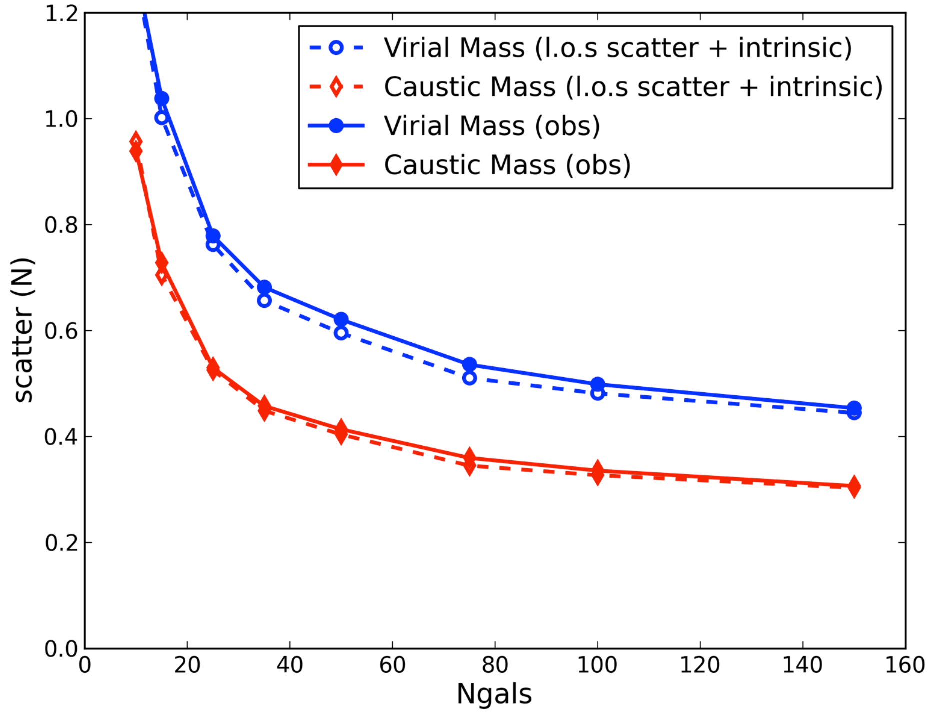
Projected



Gifford & Miller (2013)

Observational Systematics

How does scatter and bias depend on targeting?



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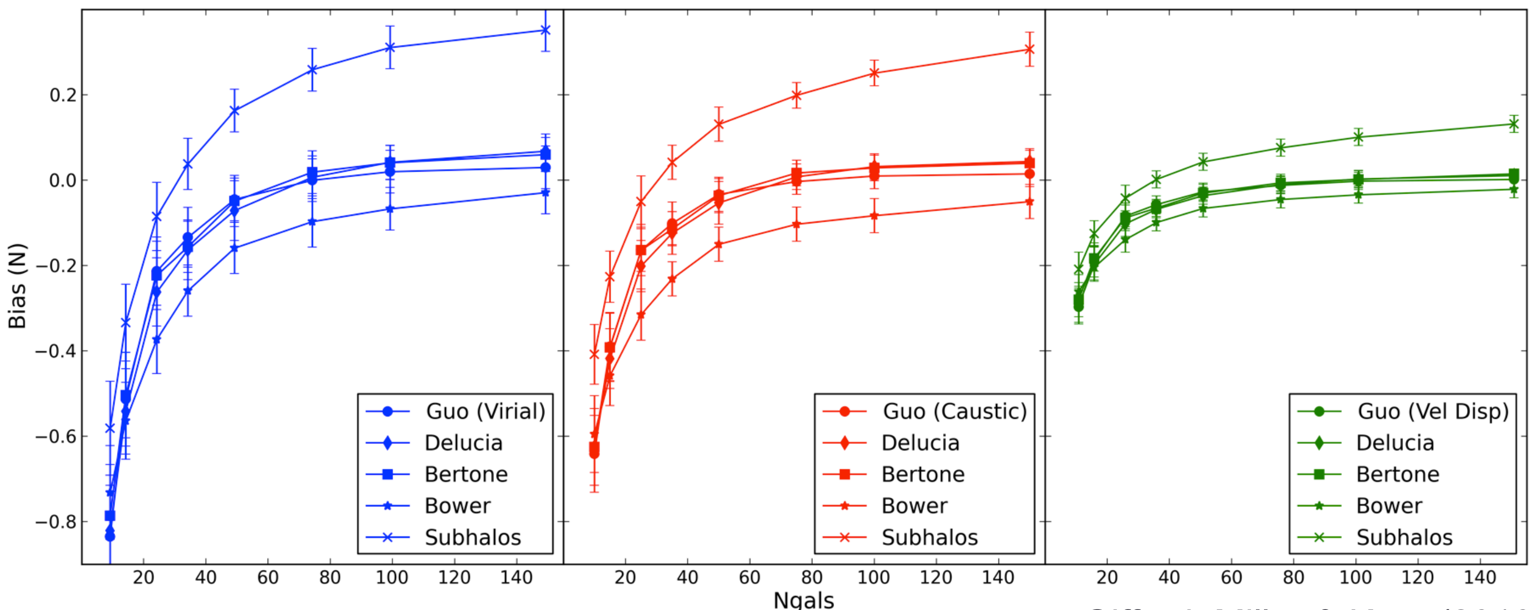

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Color, brightness, radial selection ----- secondary

Observational Systematics

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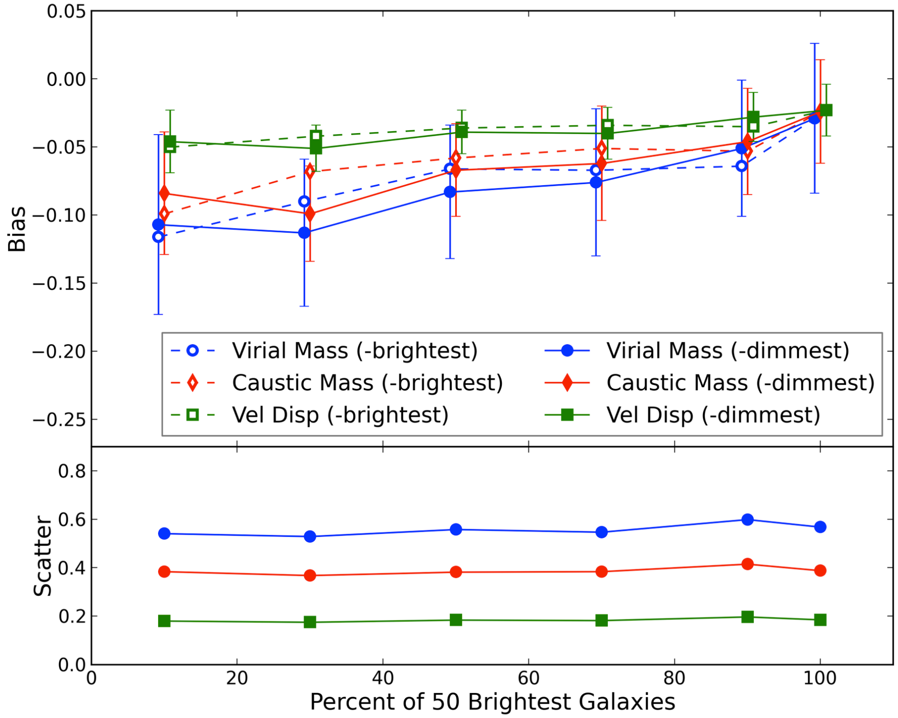

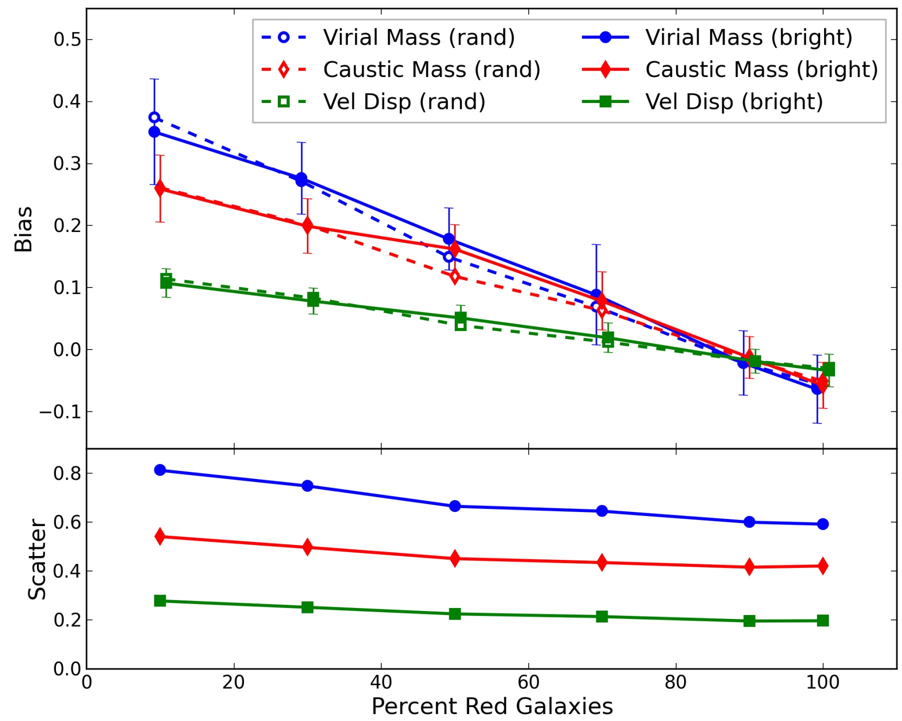

Large Sample in Light Cone

N=1500 σ = 32% b = -3%