CENTRALLY ENHANCED MASS-TO-LIGHT RATIOS IN LOW-MASS EARLY TYPE GALAXIES

EVIDENCE FOR BLACK HOLES?

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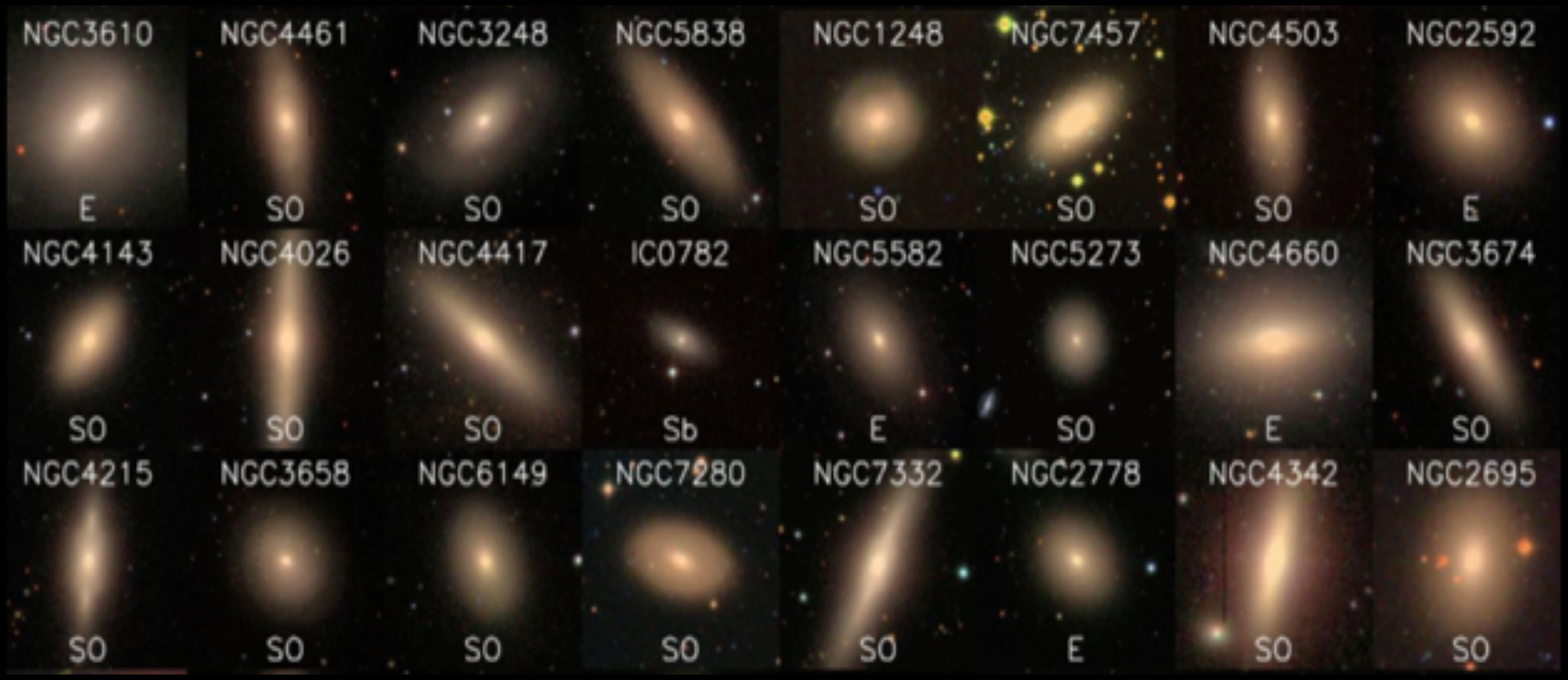
Elliptical galaxies

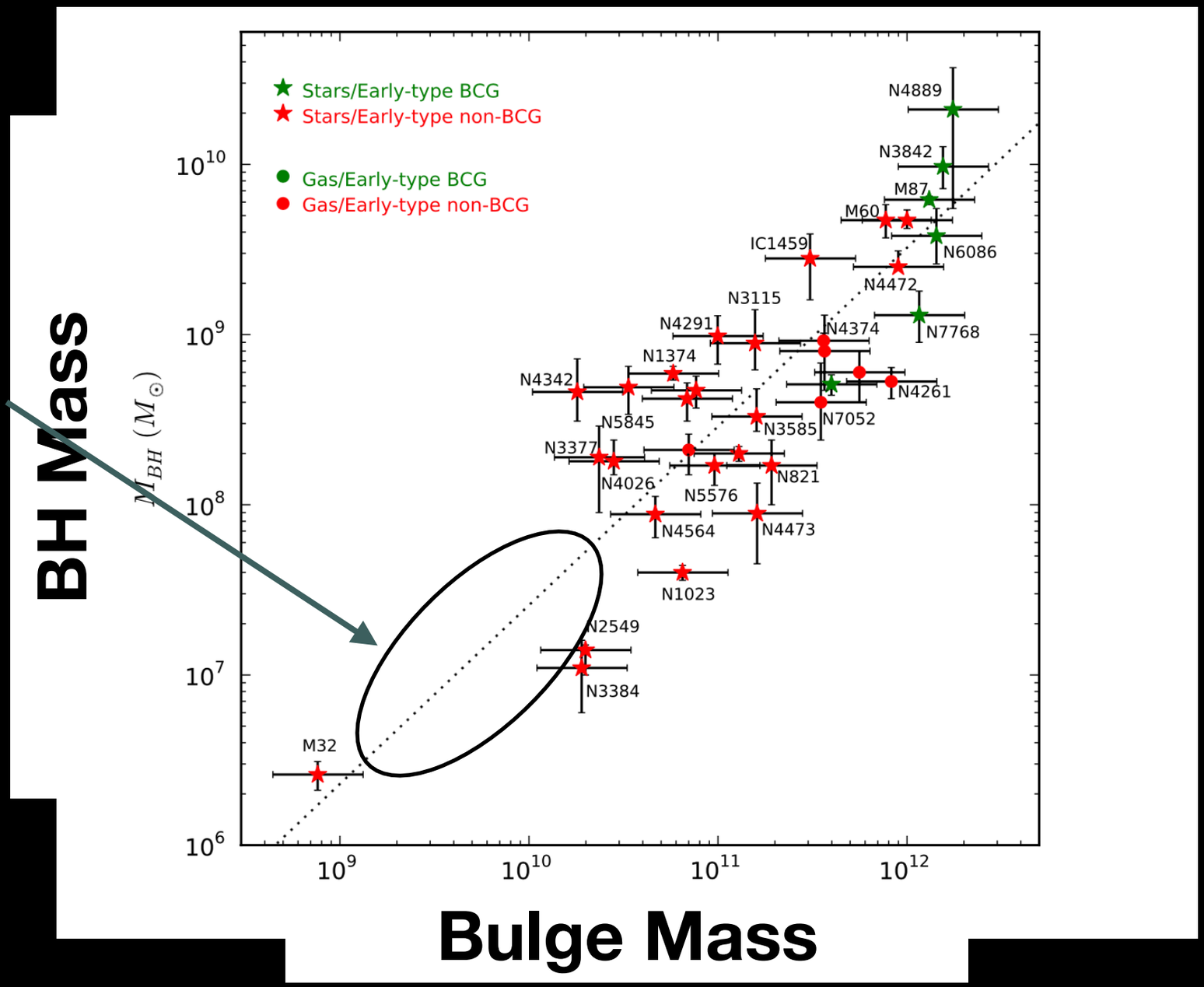
Early type galaxies (ETGs) - E and S0 type, Red and Old



Importance of low-mass ellipticals

Few BH mass estimates on low-mass ellipticals ($3x10^9\ M_\odot$ – $3x10^{10}\ M_\odot$)

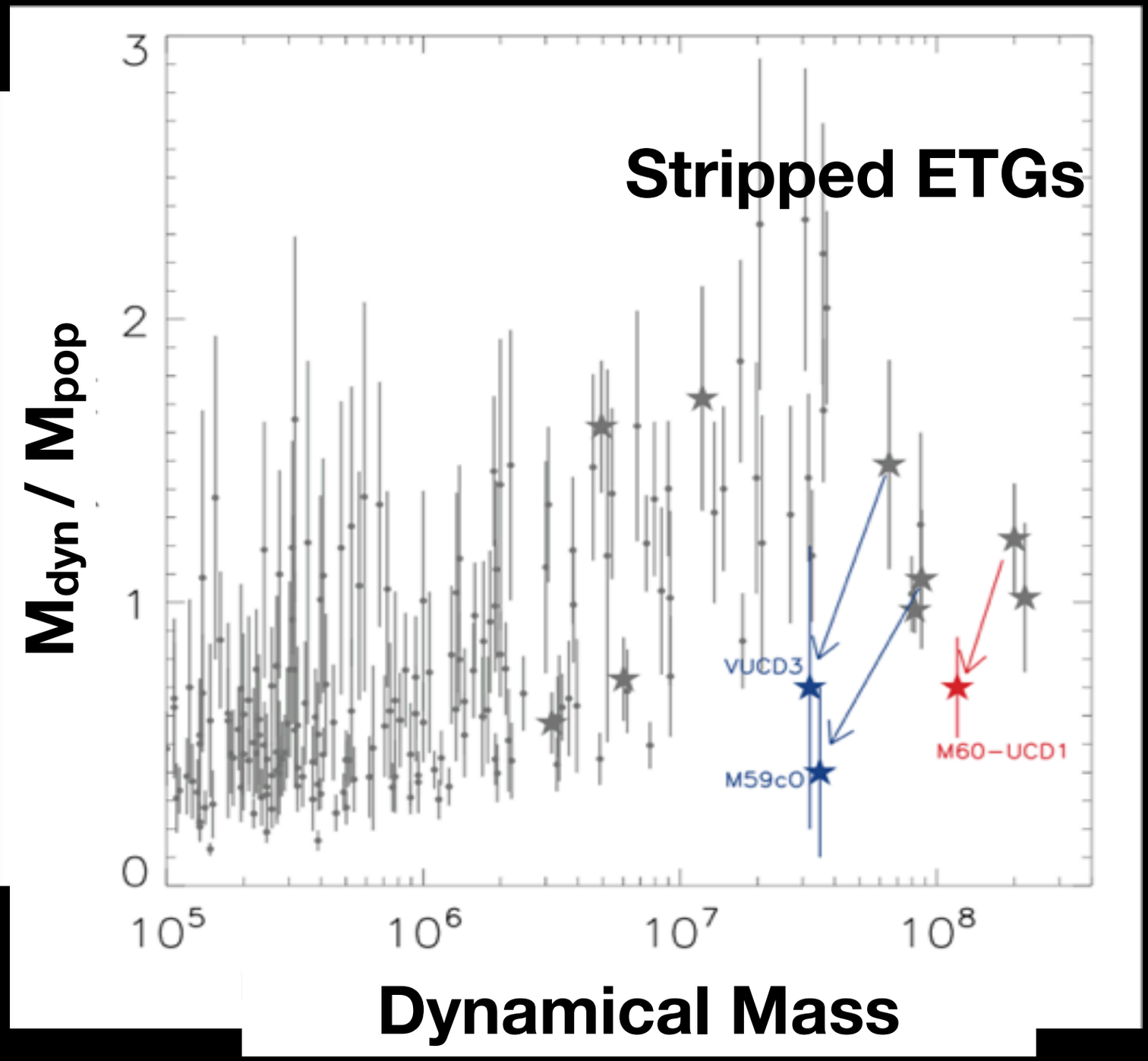
More measurements of BH masses are needed



McConnell & Ma (2013)

Possibility of detection of BHs

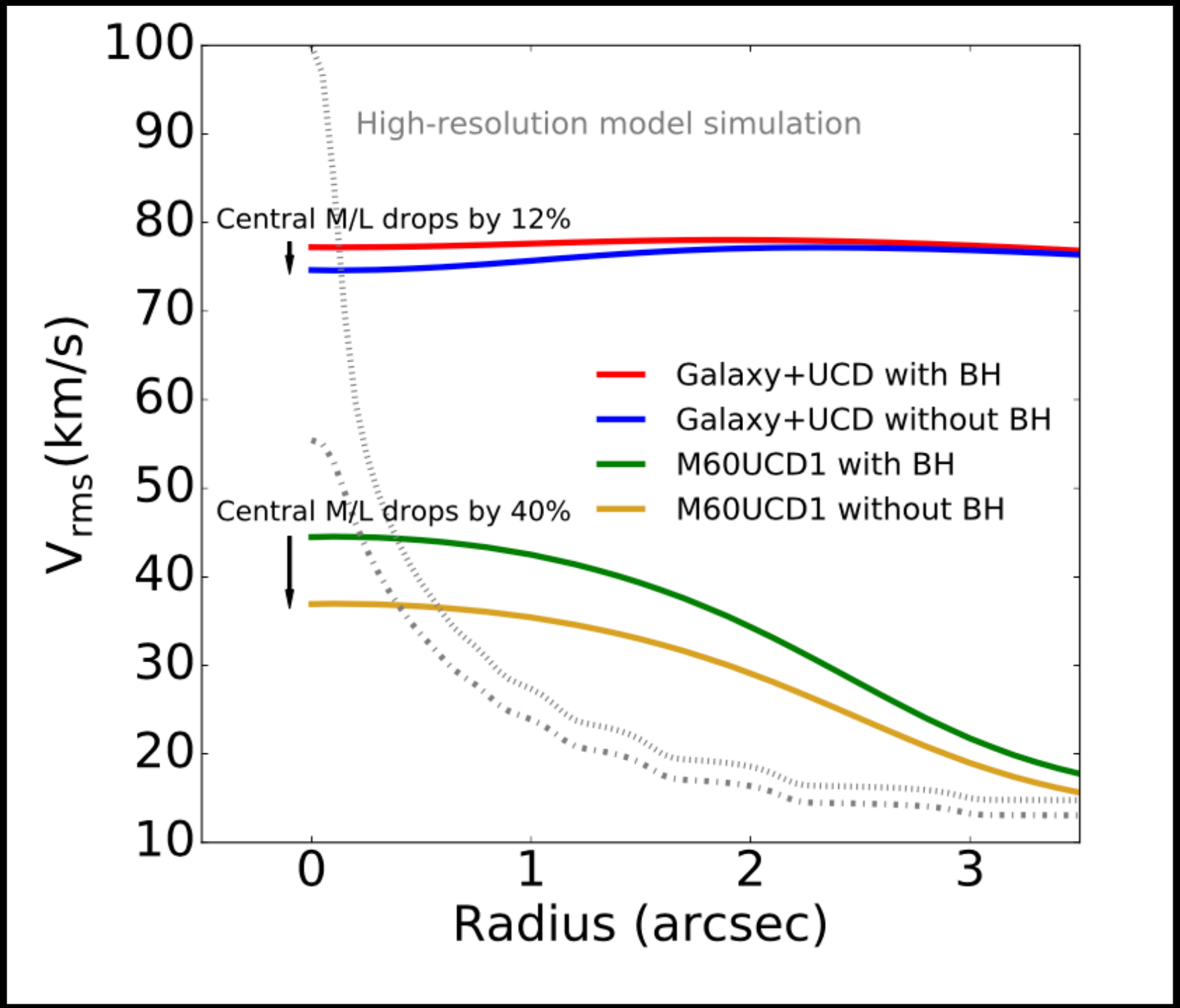
Mieske + 2013
Seth + 2014
Ahn + 2017



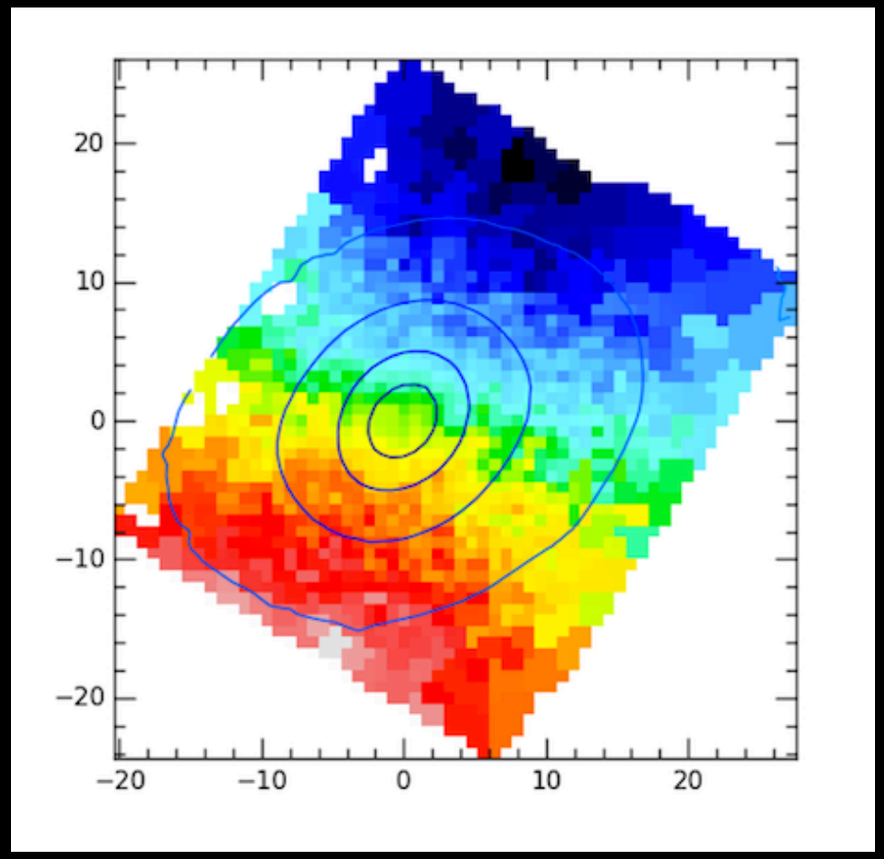
Possibility of detection of BHs

Pechetti et. al. 2017,

Submitted



Determining central M/L

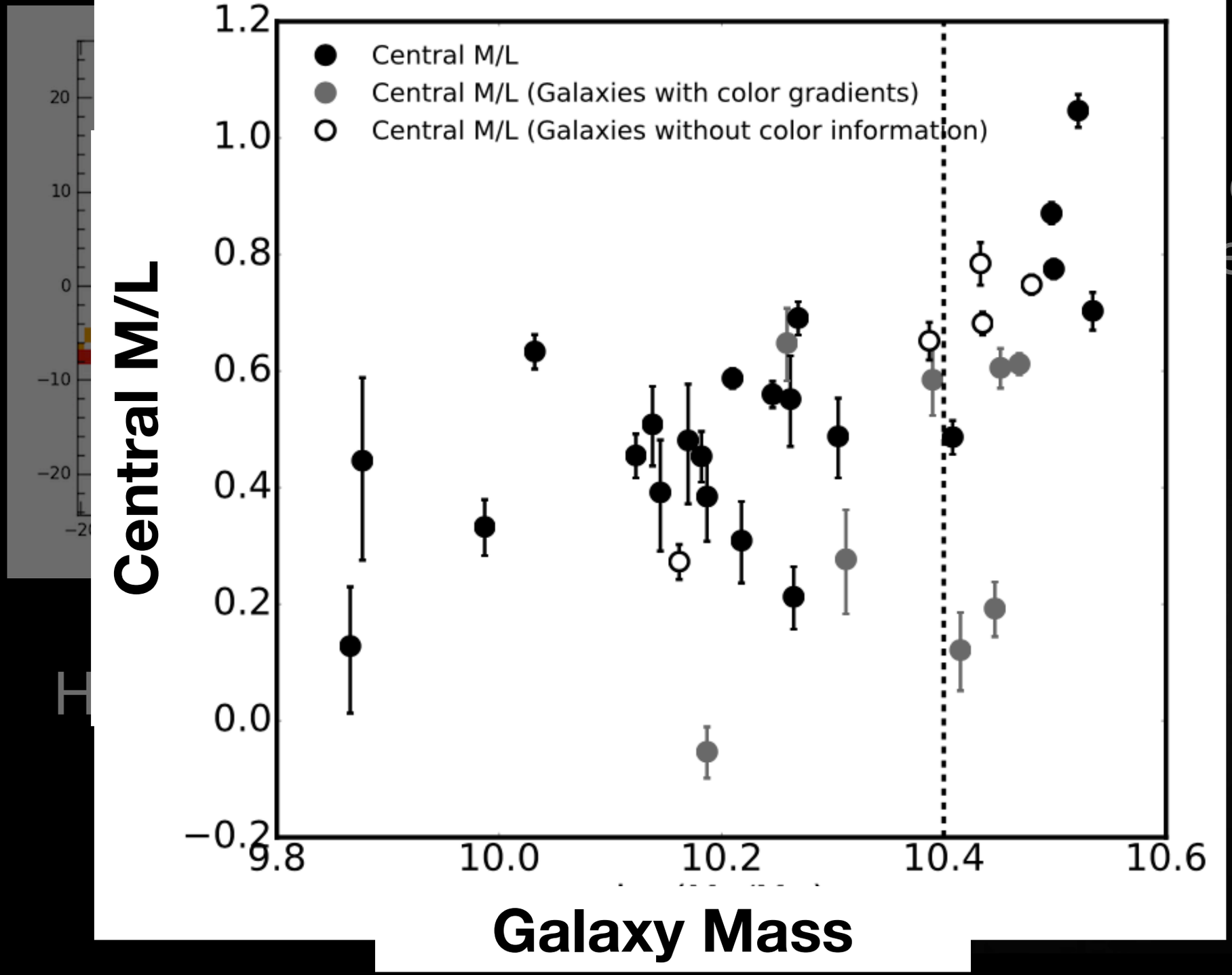


Sample of 27 low mass ETGs

ATLAS^{3D} kinematic data (central velocity dispersion)

High resolution HST data

Determining central M/L



Enhancement in central M/L

Comparing the central M/L with M/L derived by fitting the outer parts of the galaxy

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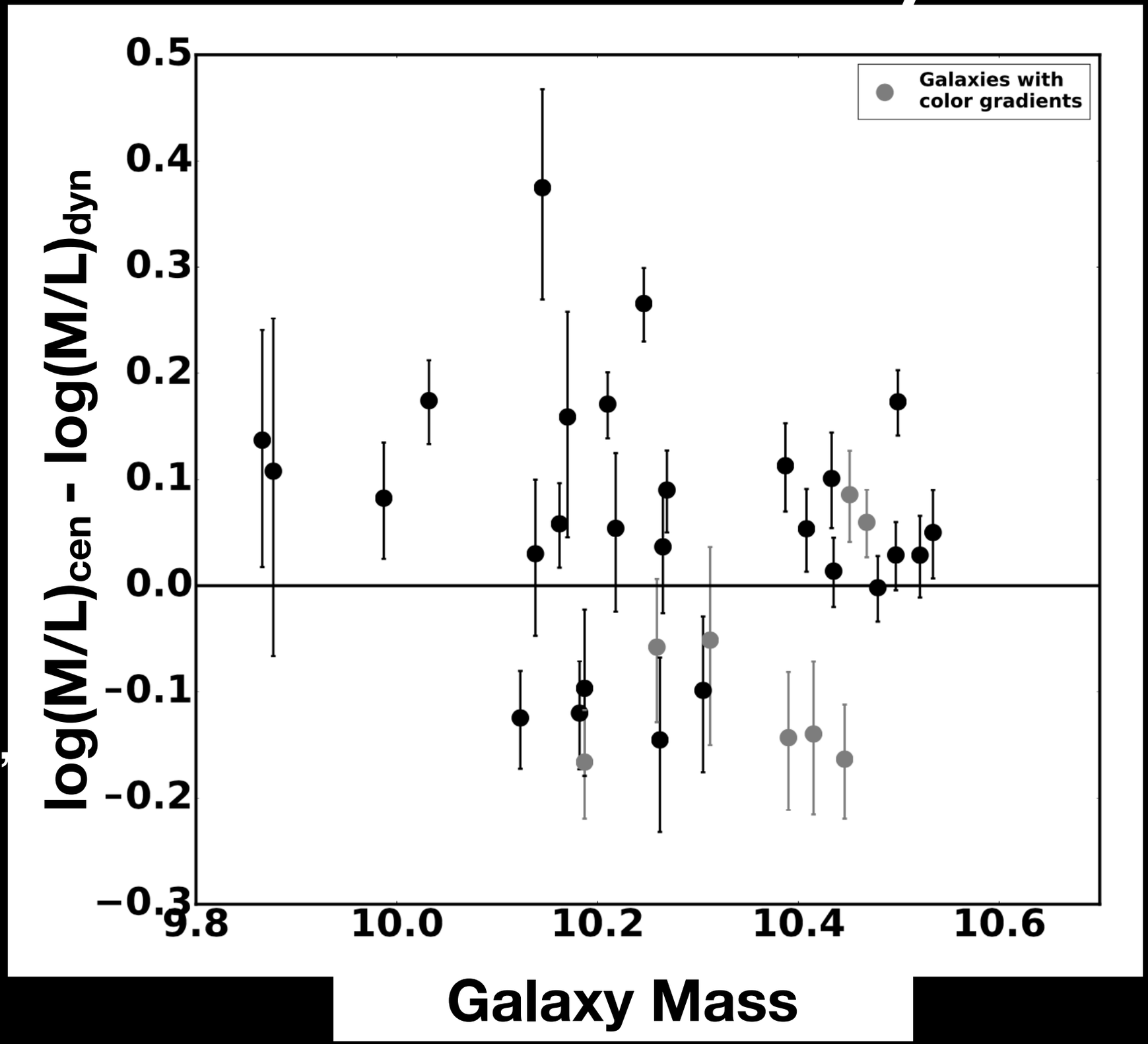
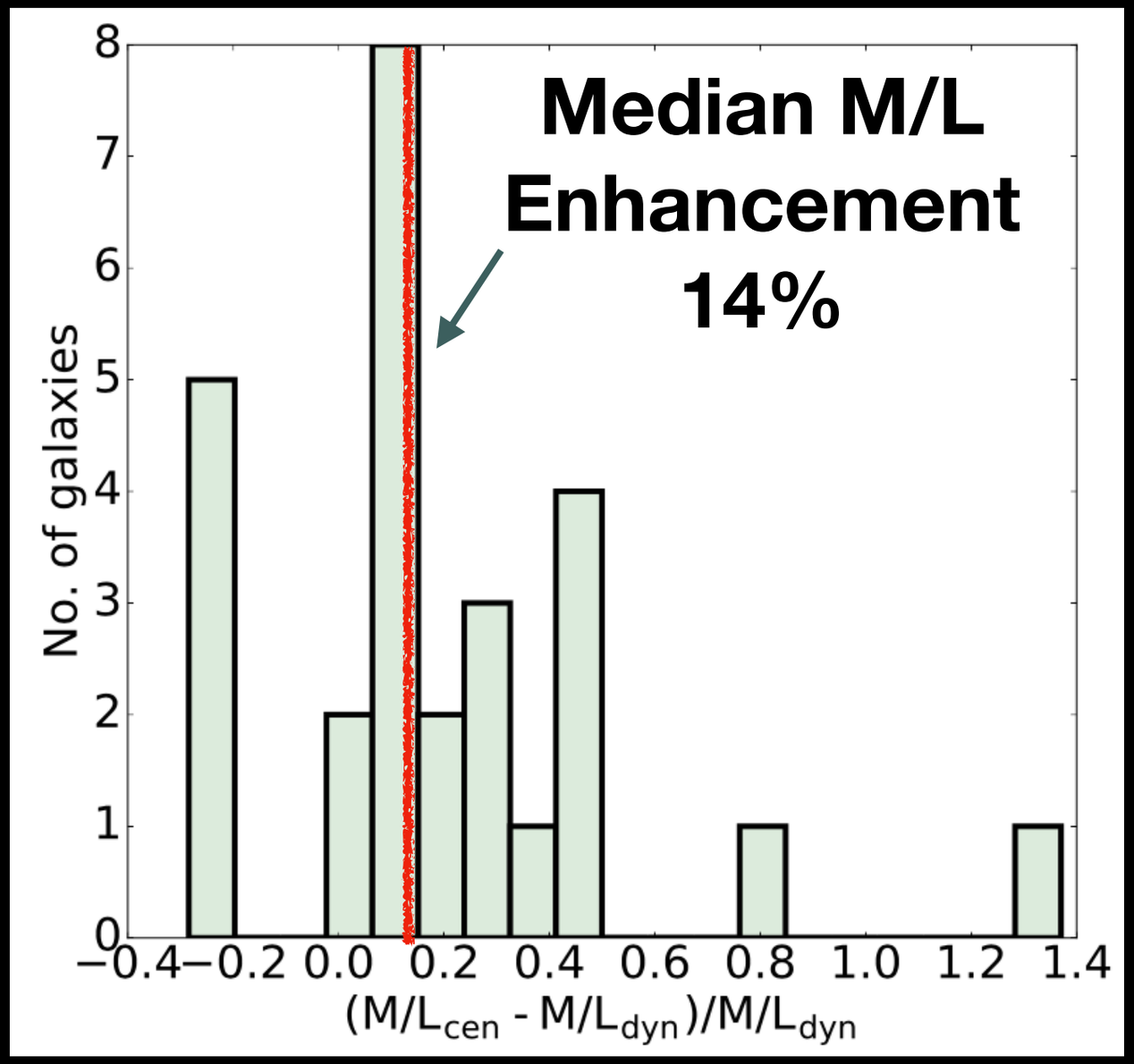
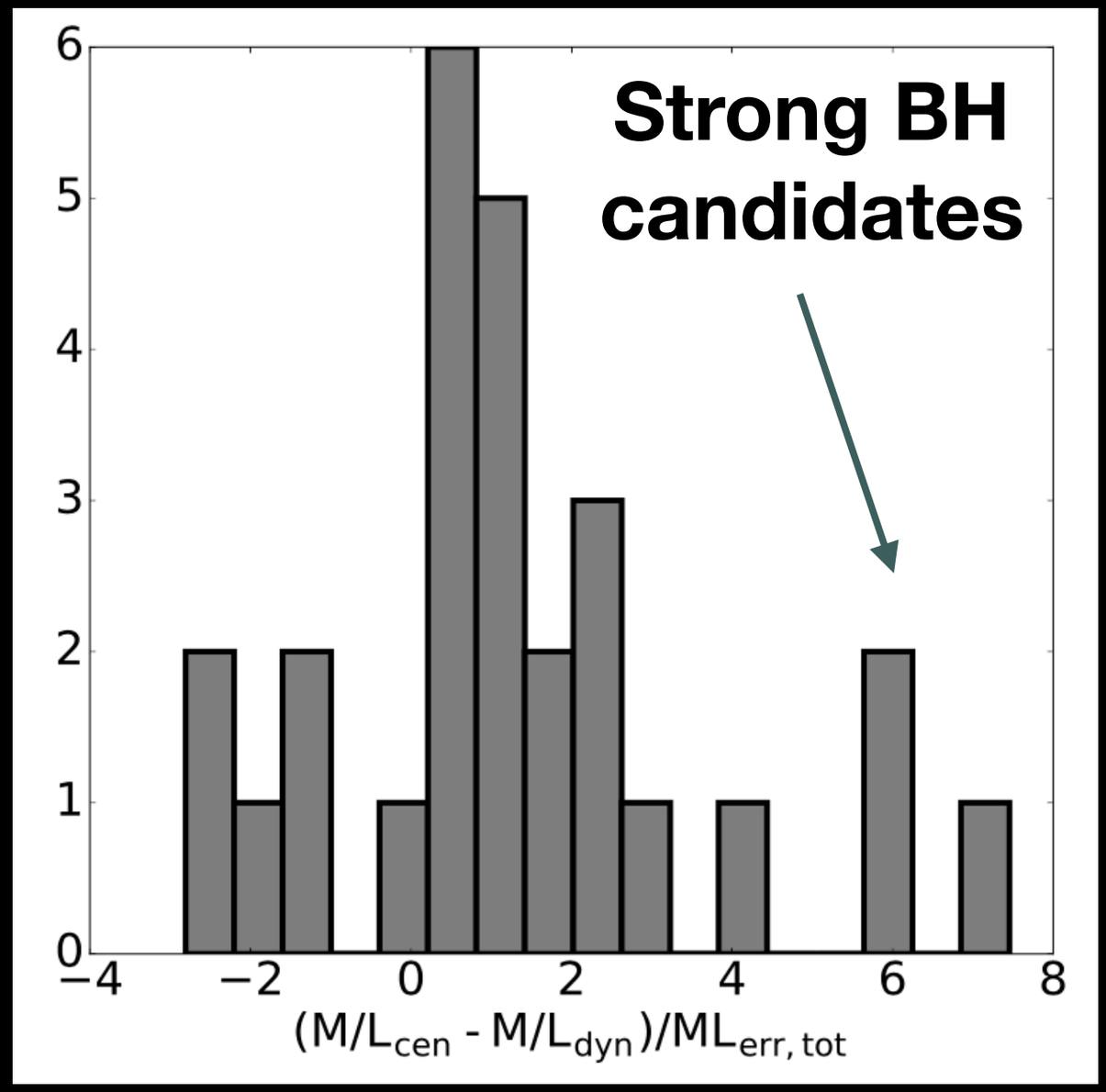


Enhancement in central M/L





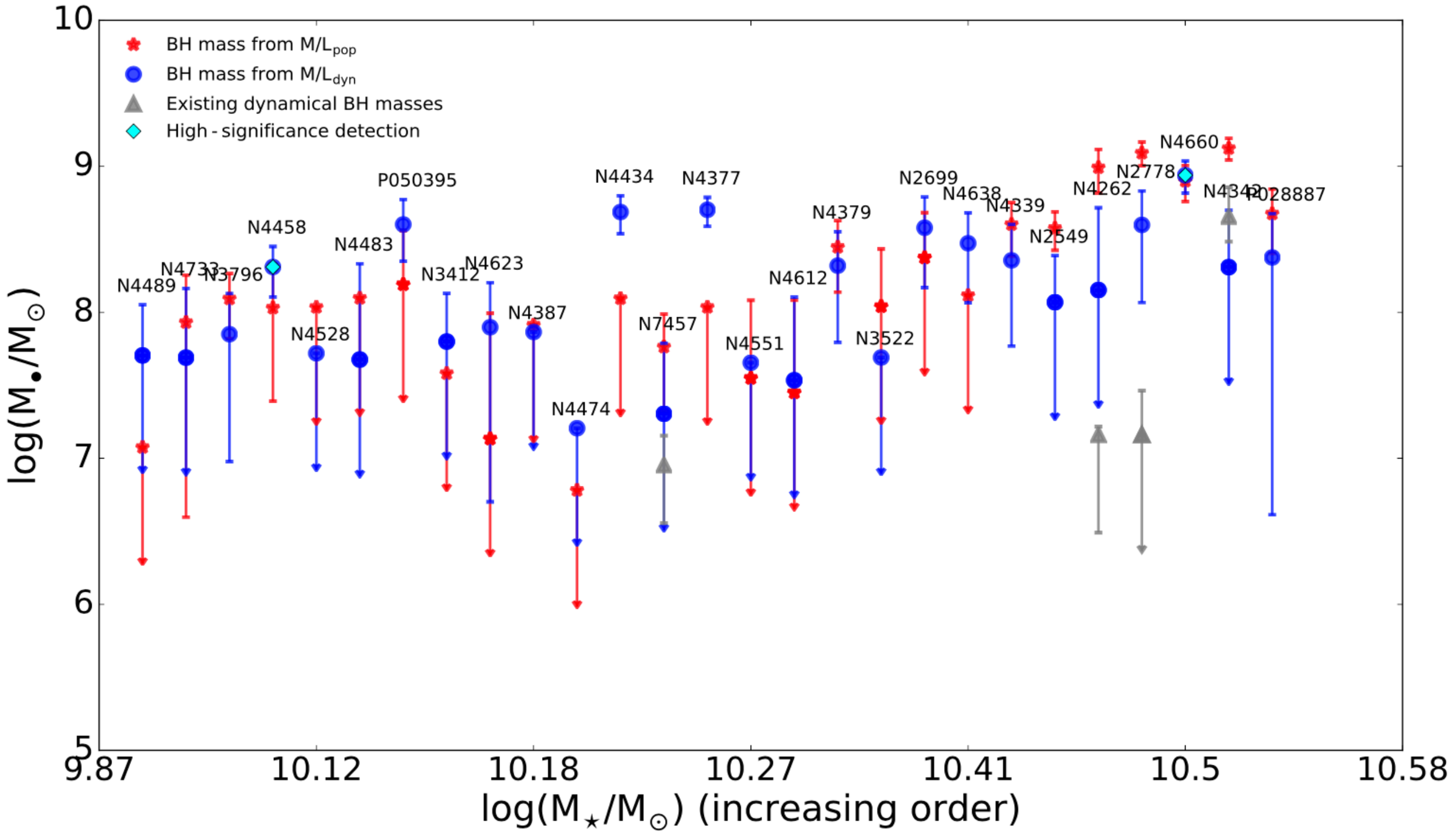
Conclusion

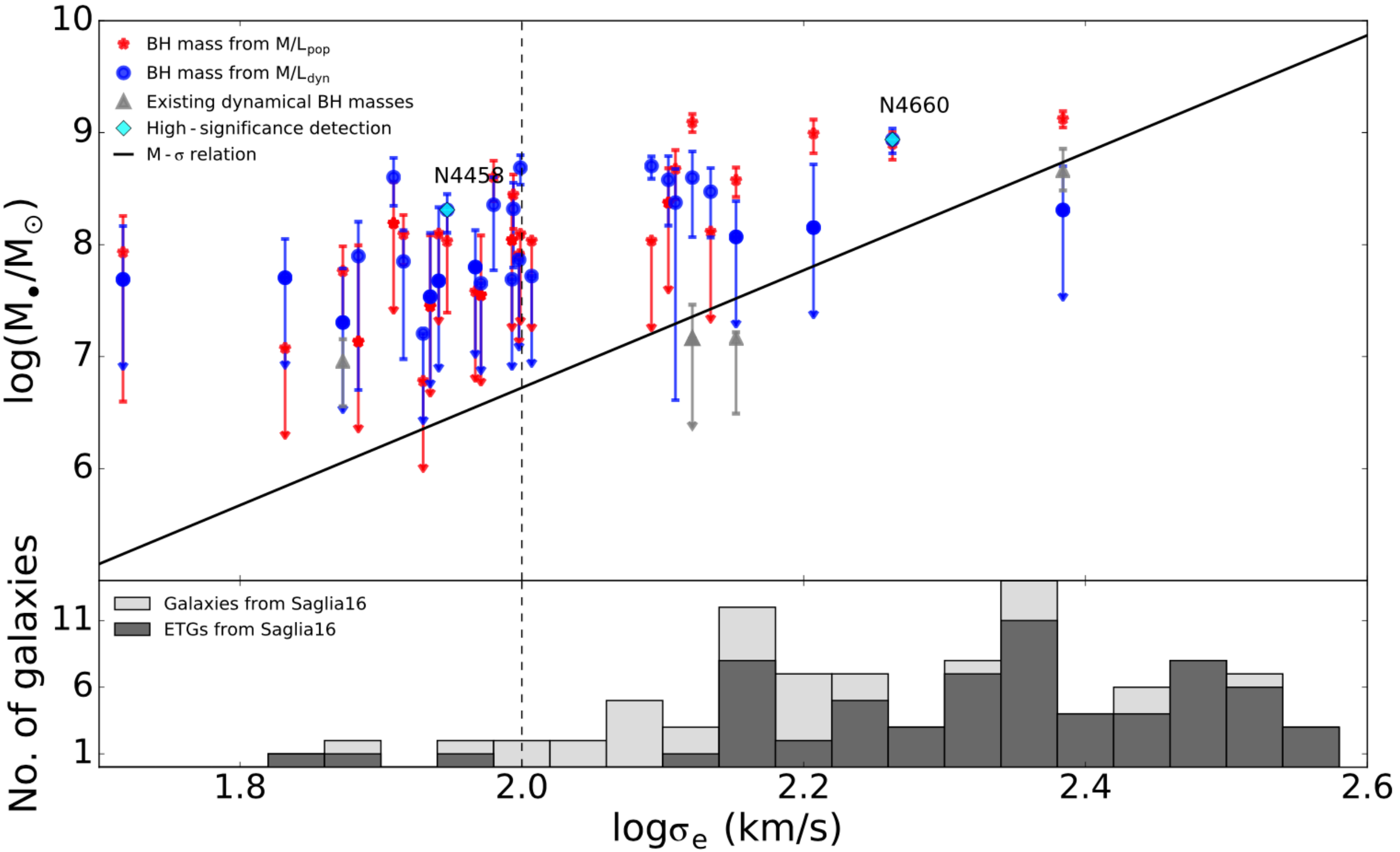
A central M/L enhancement of ~14 % is observed in the centers of these low mass elliptical galaxies

A strong possibility for the enhancement is the presence of BHs in these galaxies
or
Radial IMF variations?

Any questions, just shoot

Additional Slides


BH mass from M/L$_{pop}$
BH mass from M/L$_{dyn}$
Existing dynamical BH masses
High - significance detection
log(M$_\bullet$/M$_\odot$)
log(M$_\star$/M$_\odot$) (increasing order)
10
9
8
7
6
5
9.87
10.12
10.18
10.27
10.41
10.5
10.58
N4489
N4733
N3796
N4458
N4528
N4483
P050395
N3412
N4623
N4387
N4434
N4377
N4474
N7457
N4551
N4612
N4379
N3522
N2699
N4638
N4339
N2549
N4262
N2778
N4660
N4342
P028887


BH mass from M/L$_{pop}$
BH mass from M/L$_{dyn}$
Existing dynamical BH masses
High - significance detection
M - σ relation
N4458
N4660
log(M•/M⊙)
10
9
8
7
6
Galaxies from Saglia16
ETGs from Saglia16
No. of galaxies
11
6
1
1.8
2.0
2.2
2.4
2.6
logσ$_e$ (km/s)