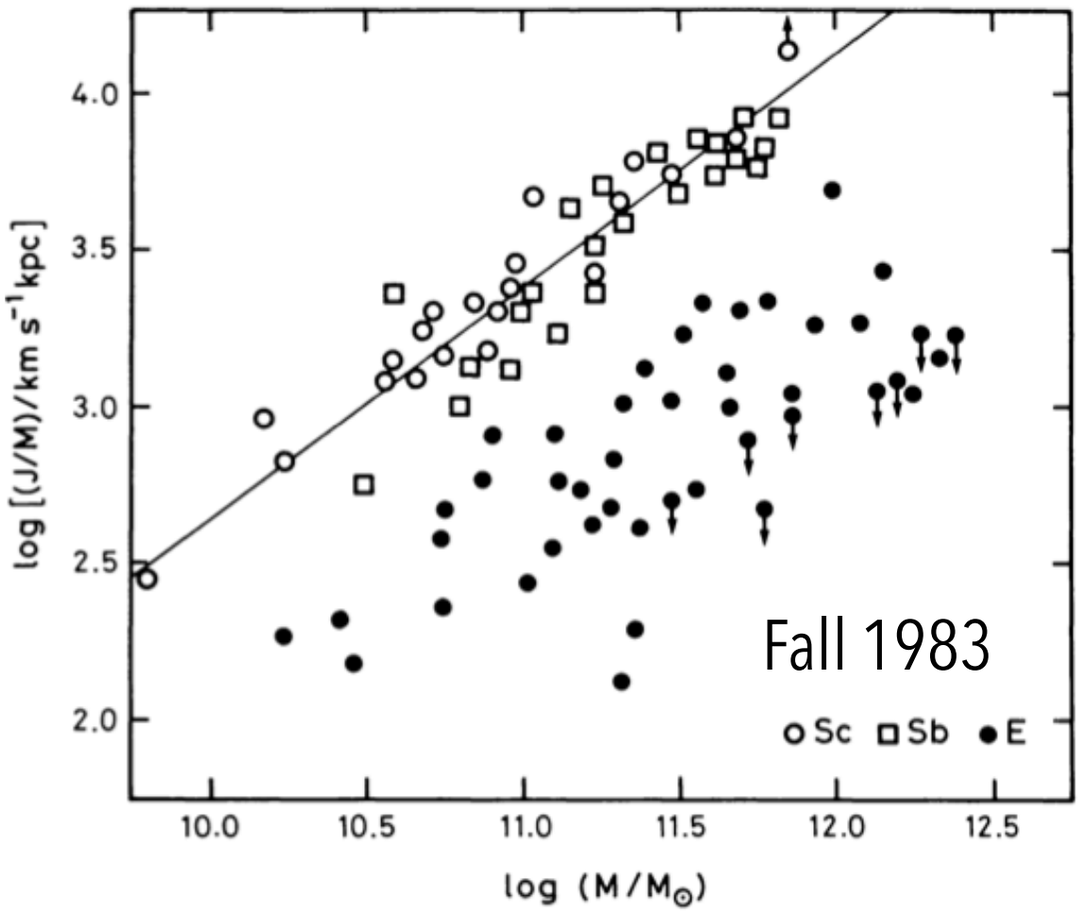
University of Zurich[UZH]

Galactic angular momentum in cosmological zoom-ins: disk-bulge decompositions and the galaxy-halo connection

Aleksandra Sokolowska with P. R. Capelo, M. Fall, L.Mayer, S.Bonoli, S.Shen

Specific angular momentum vs. mass

$$j \propto M^{2/3}$$



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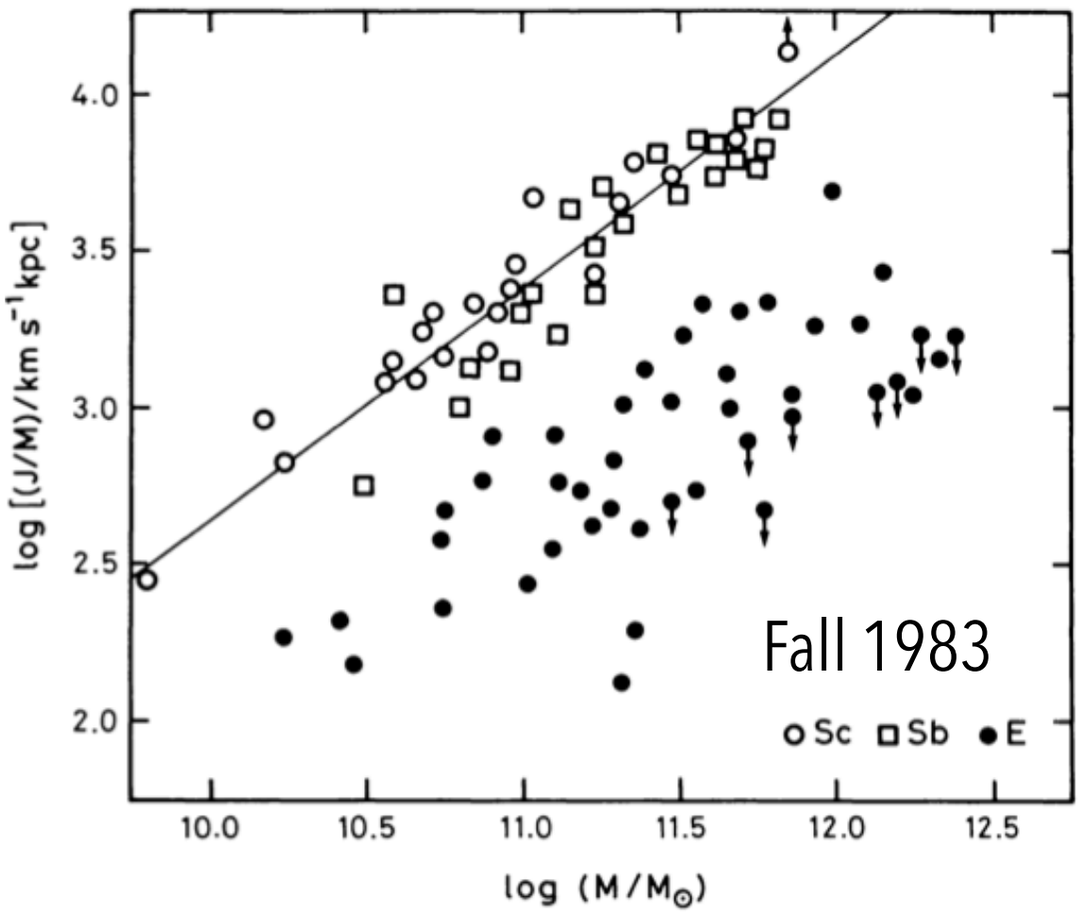
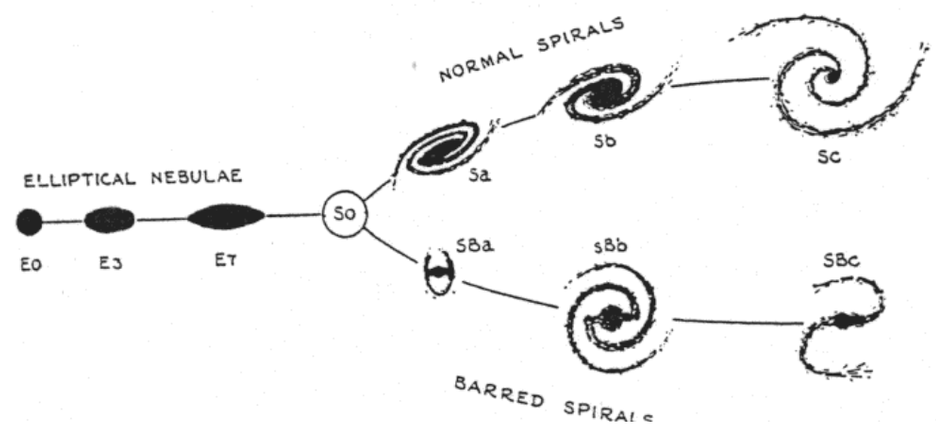
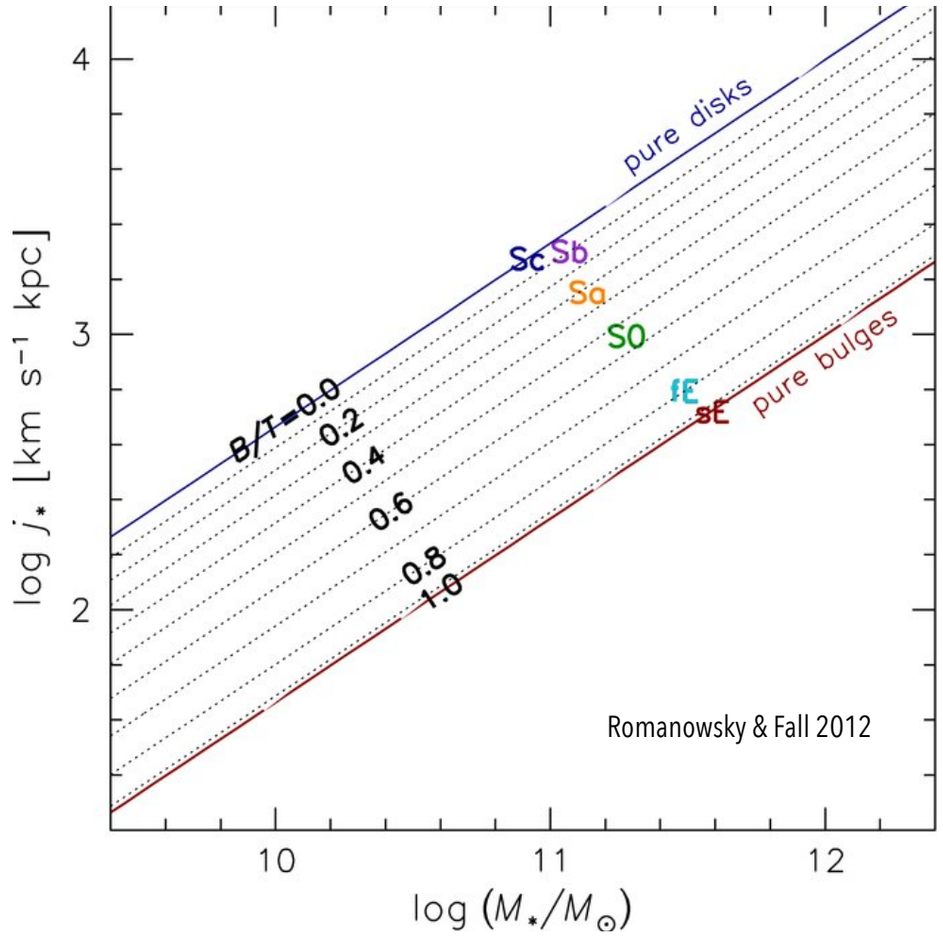


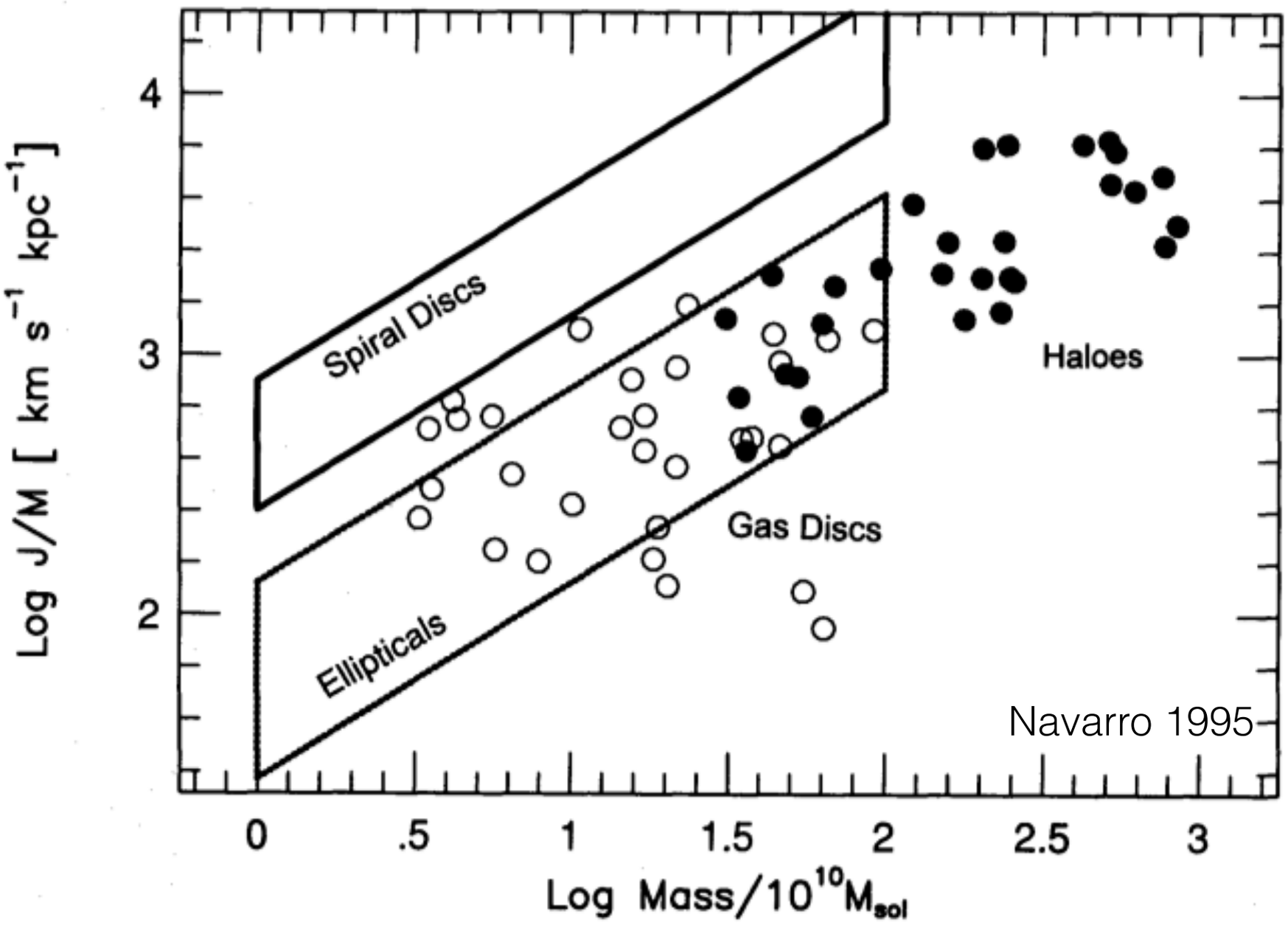
Galactic angular momentum





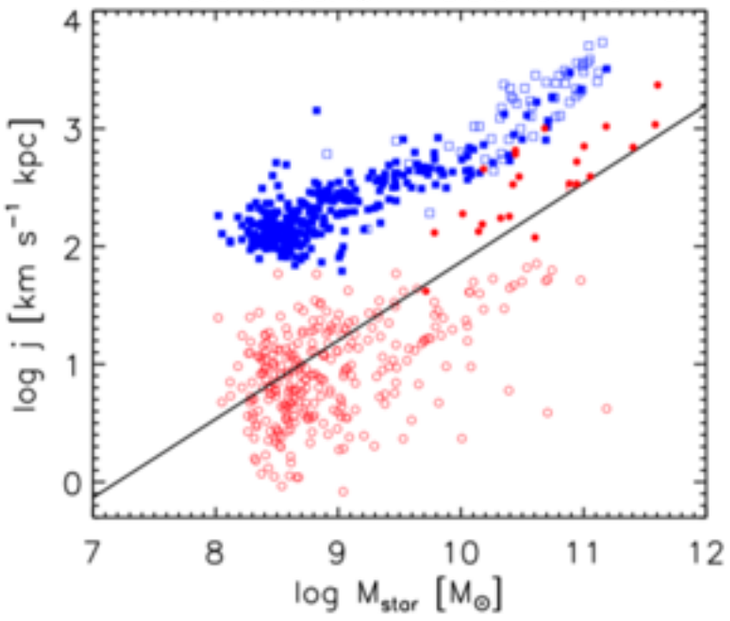
Carving through the codes 2017

Angular momentum catastrophe

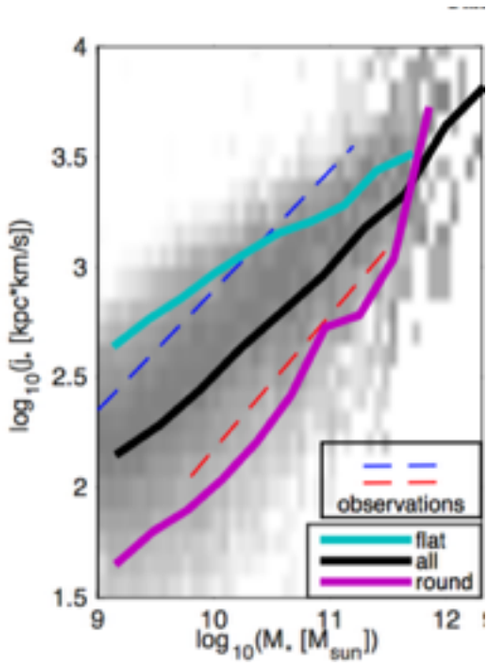


Large scale simulations + zoom-ins

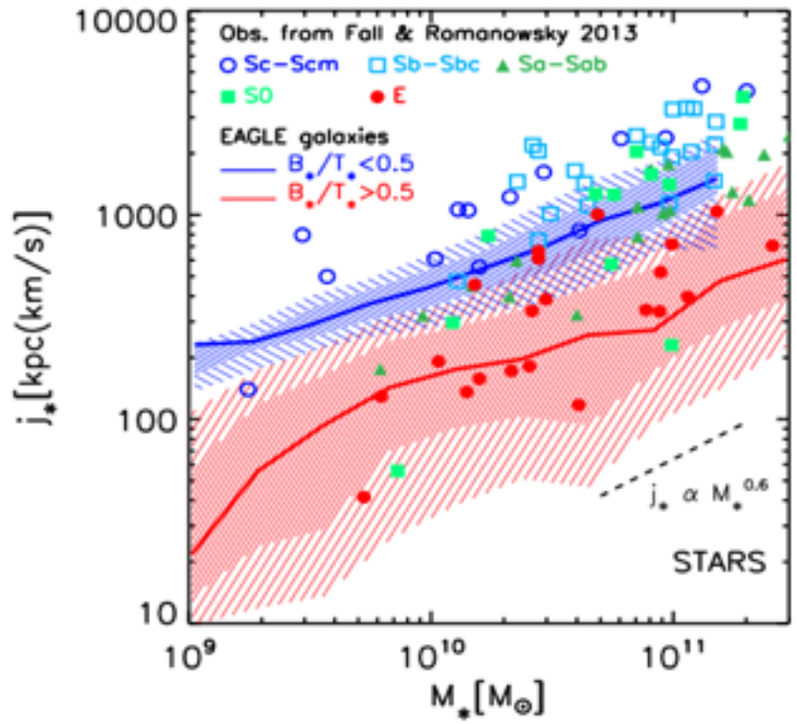
Pedrosa & Tissera 2015



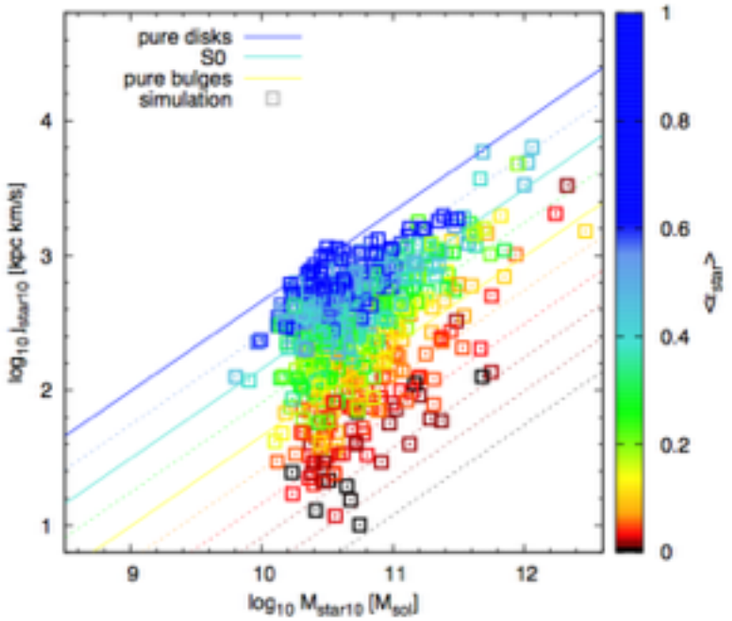
Genel et al. 2016



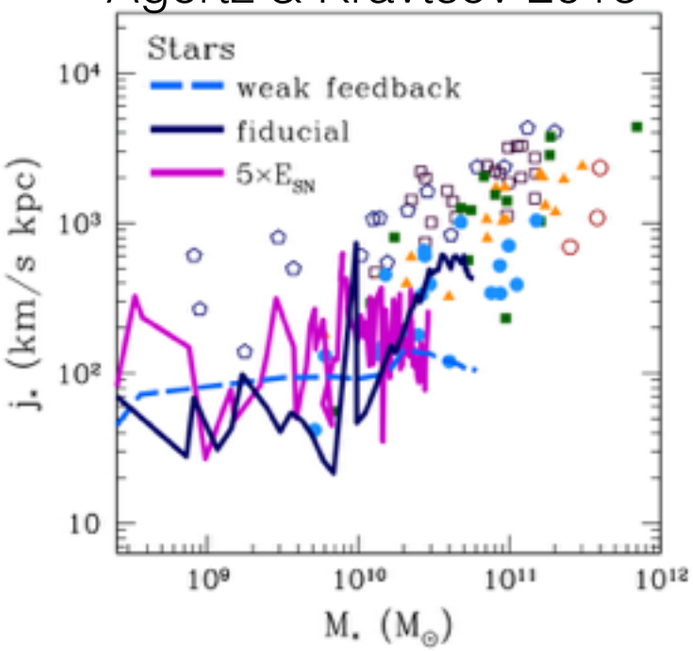
Zavala et al. 2015



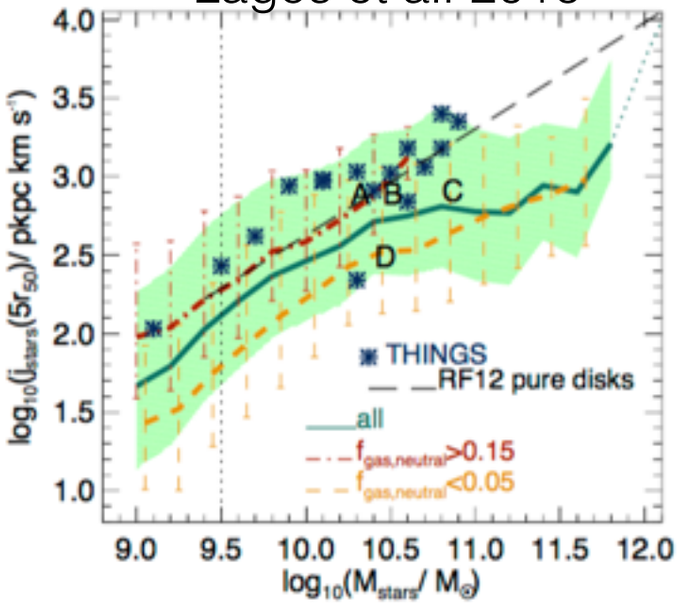
Teklu et al. 2015



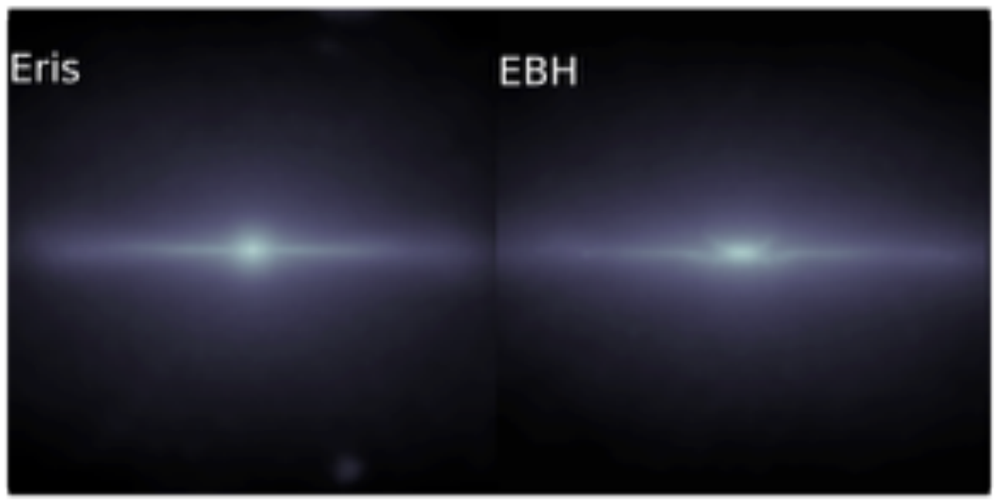
Agertz & Kravtsov 2016



Lagos et al. 2016



We have 4 zoom-ins:



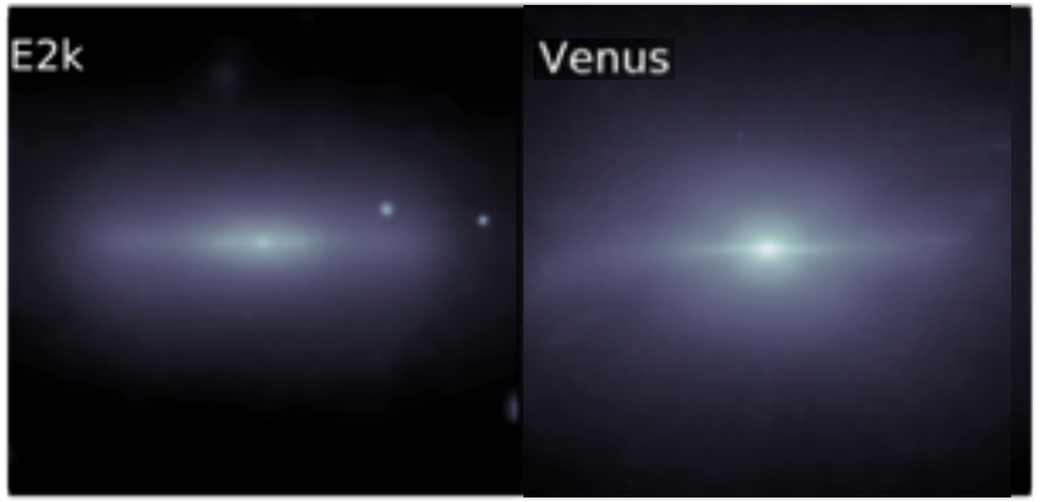


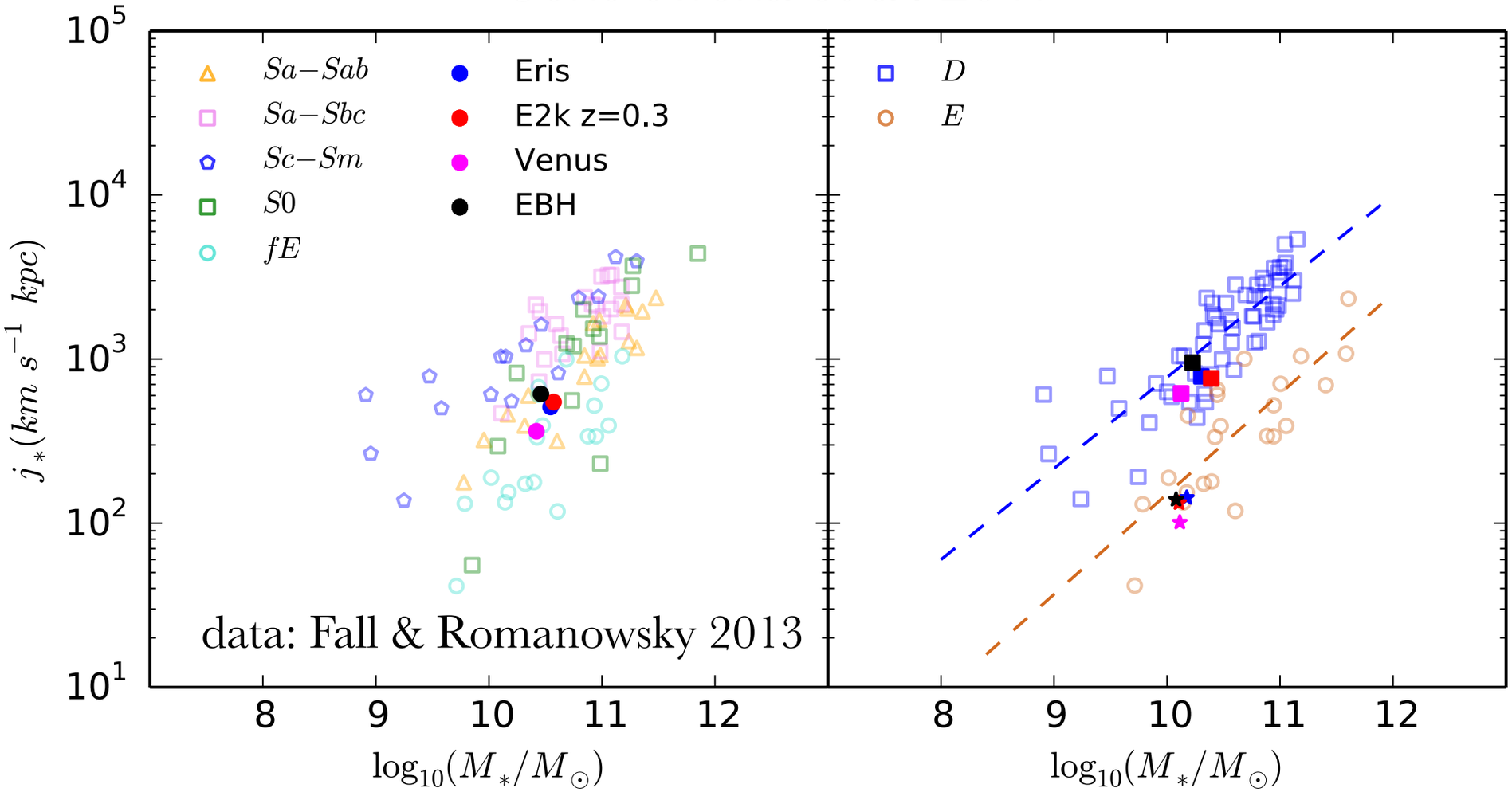
TABLE OF RUNS

Eris (default)	feedback: blastwave SN, no metal cooling over 10^4K, Schmidt law for SF with a high density threshold, quiet merger history
EBH	default ICs +"Quasar mode" thermal feedback with Bondi-Hoyle accretion
Venus	ICs with active merger history, same parameter choice as Eris for cooling, SF and feedback
E2k	default ICs + CLOUDY metal cooling, higher efficiency of SNe, higher SF threshold, new IMF

Specific angular momentum

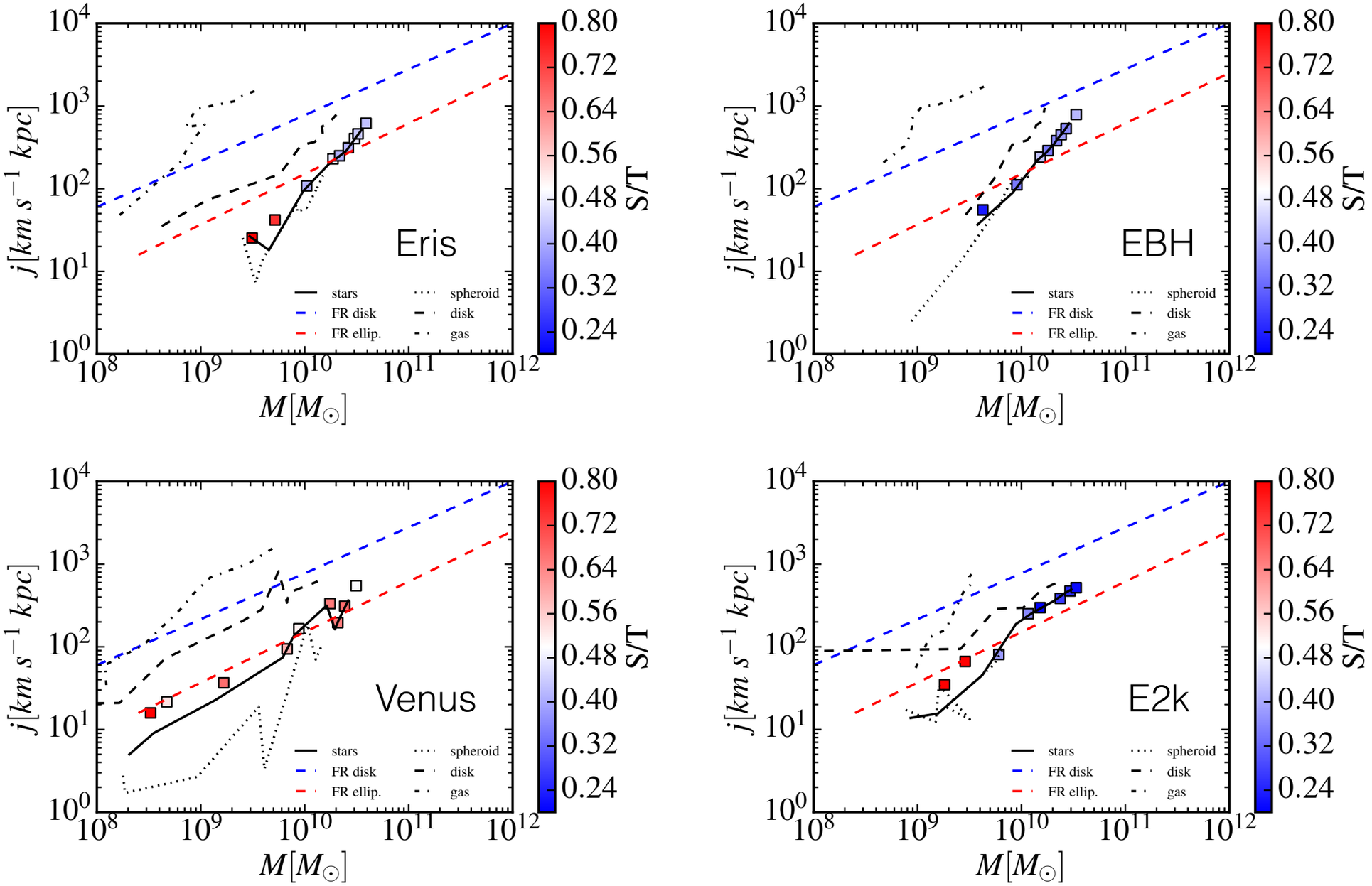
$$\mathbf{j}_k = \frac{\sum_i m_{k,i} \mathbf{r}_{k,i} \times \mathbf{v}_{k,i}}{\sum_i m_{k,i}},$$

Sokolowska et al. 2017



Evolution of the specific angular momentum

Sokolowska et al. 2017



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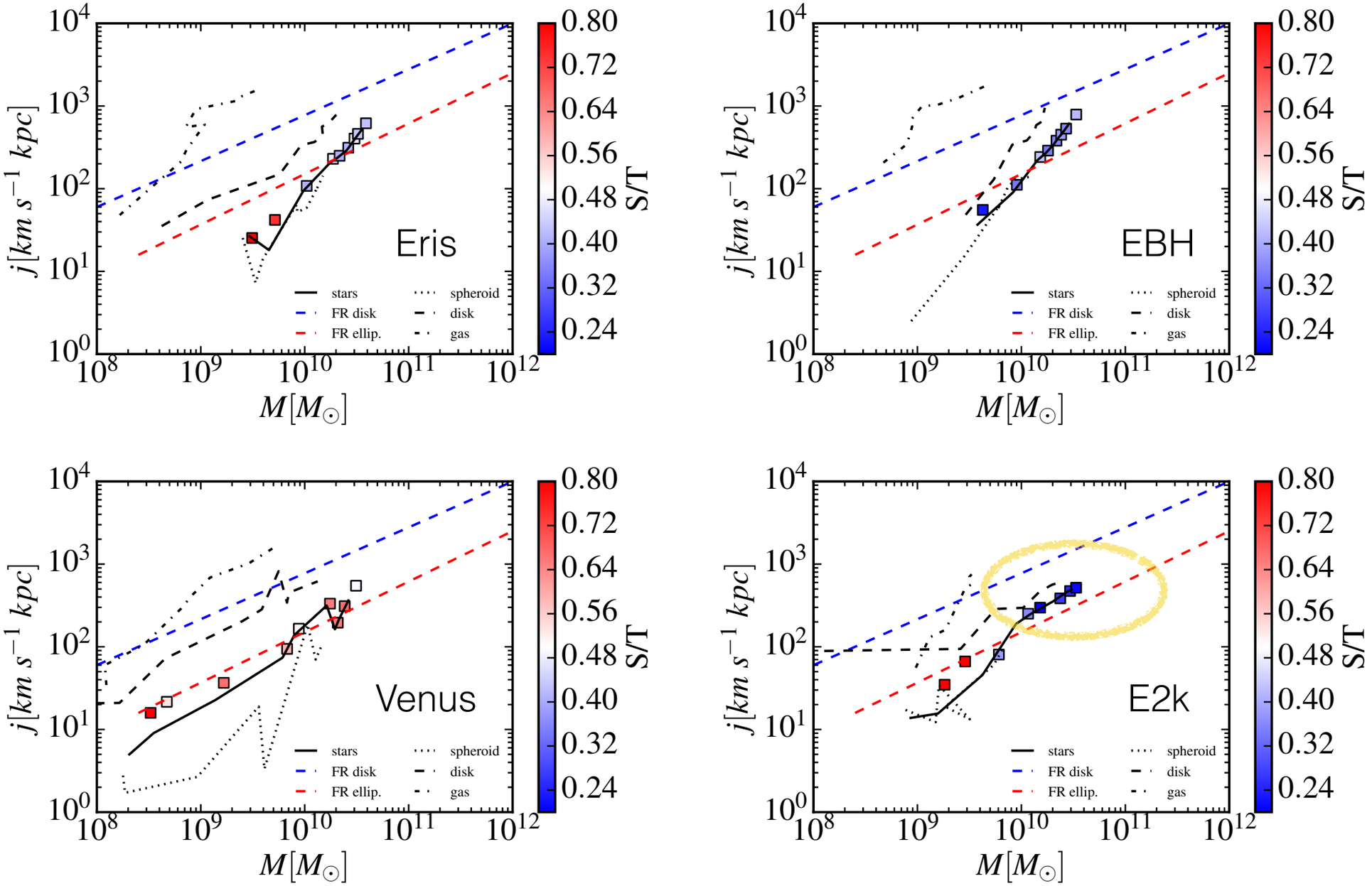
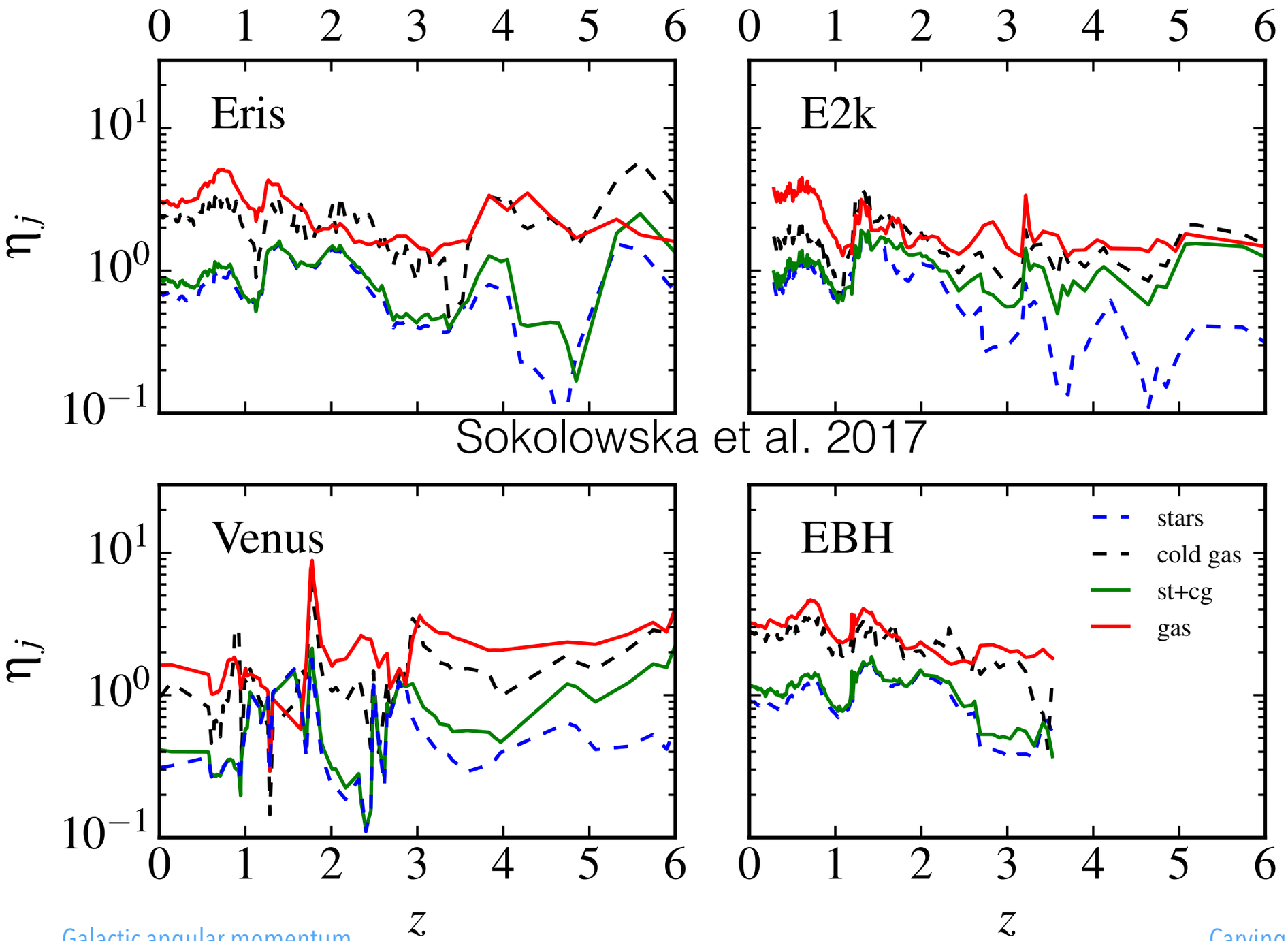


Retention factors

$$\eta \equiv \frac{j_i}{j_{halo}}$$

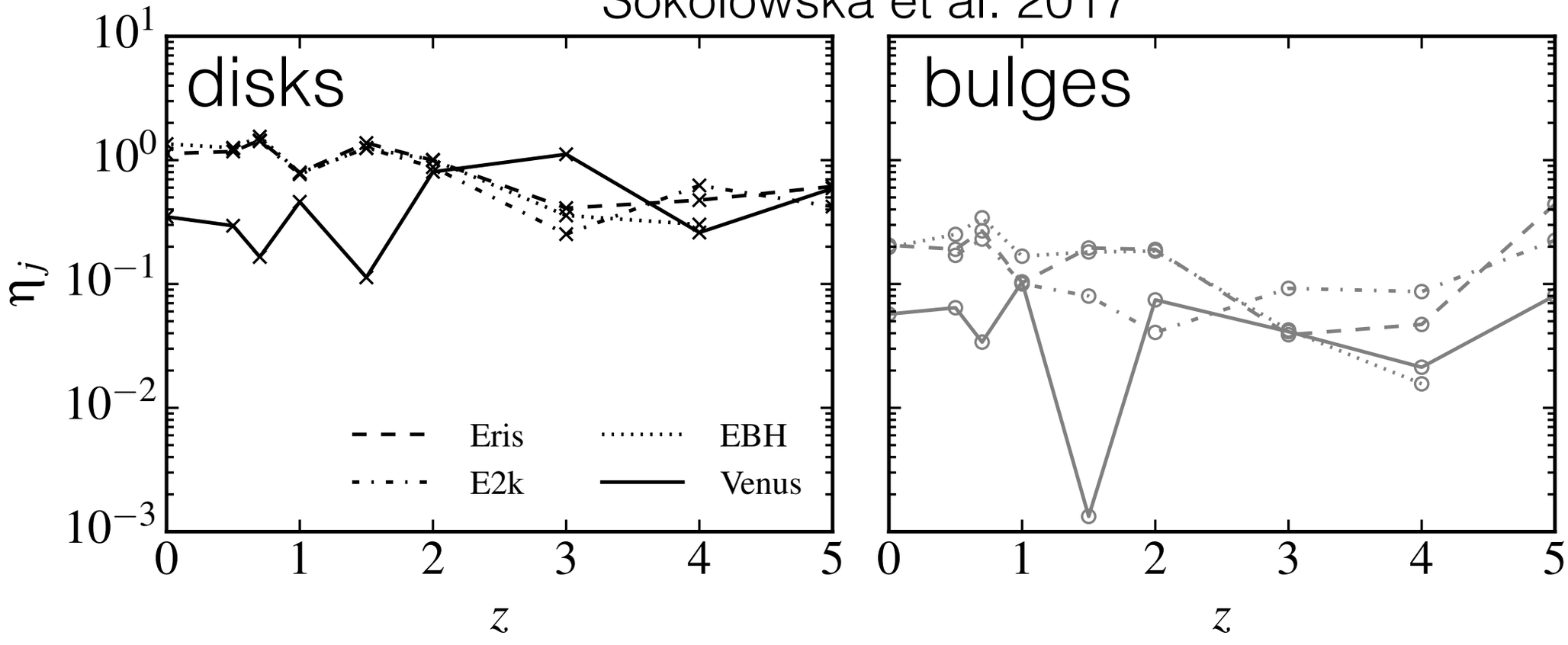


Sokolowska et al. 2017

Retention factors for disks and spheroids

$$\eta \equiv \frac{j_*}{j_{halo}}$$

Sokolowska et al. 2017



Conclusions

- our normal galaxies free of AM catastrophe

- bulges and disks separated by a factor of 5-6 in j-M diagrams, same as pure disks and pure ellipticals

Conclusions

- our normal galaxies free of AM catastrophe
- bulges and disks separated by a factor of 5-6 in j-M diagrams, same as pure disks and pure ellipticals
- evolutionary tracks $j \sim M^{2/3}$ in single objects with stable morphologies
- retention factors depend weakly on redshift
- extracted disks "conserve" the AM of their parent halos