Reconciling a significant buildup of massive early-type galaxies through major mergers at z≤1 with mass-downsizing

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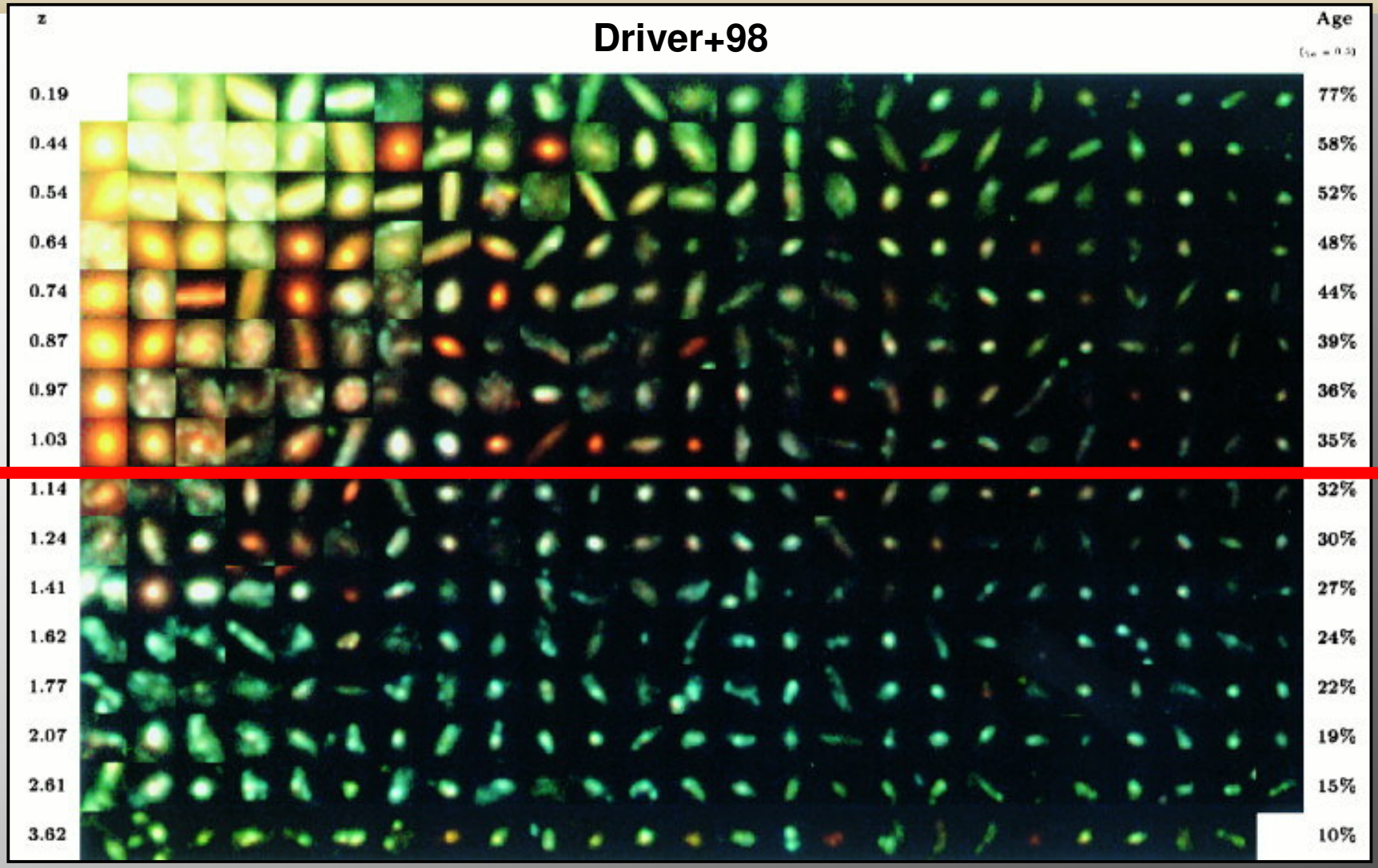
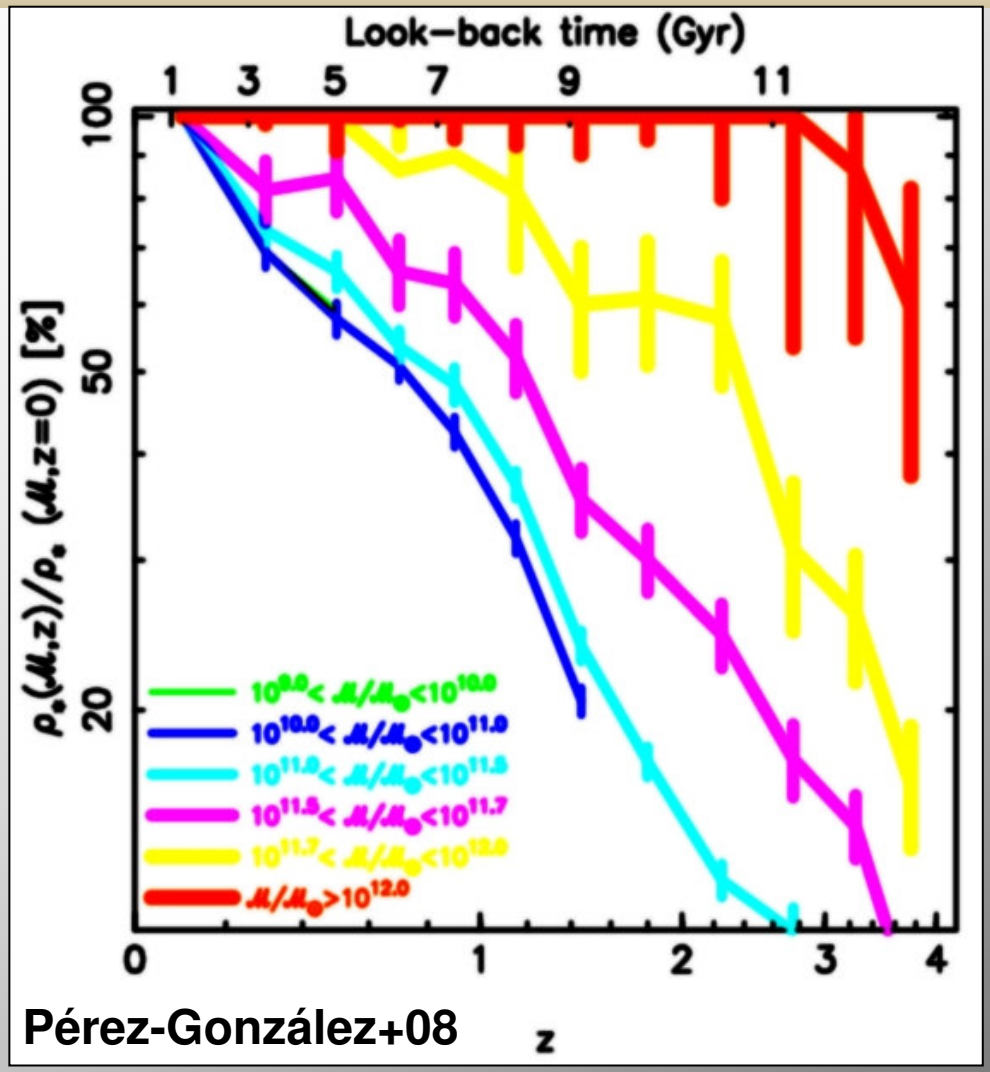
I- Introduction
Assembly of early-type galaxies



I- Introduction
Galaxy mass-downsizing



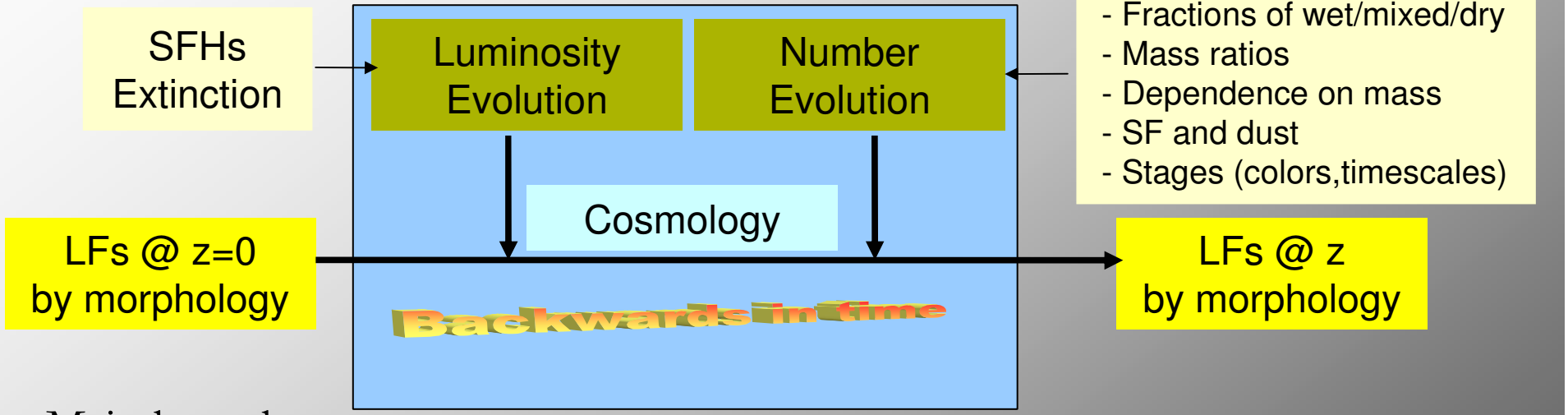
✓ Downsizing in mass and the hierarchical scenario, in apparent contradiction.

✓ We propose a direct test to the hierarchical origin of massive early-type galaxies (ETGs):

How would have evolved the population of massive ETGs backwards in time, assuming that they derive from the major mergers that are strictly reported by observations?

II- Models
General overview

Original code: Gardner (1998)



Main hypotheses:

✓ Each major merger gives place to an ETG.

✓ Gas-rich major mergers undergo phases of dust-reddened, star-forming galaxies (DSFs).

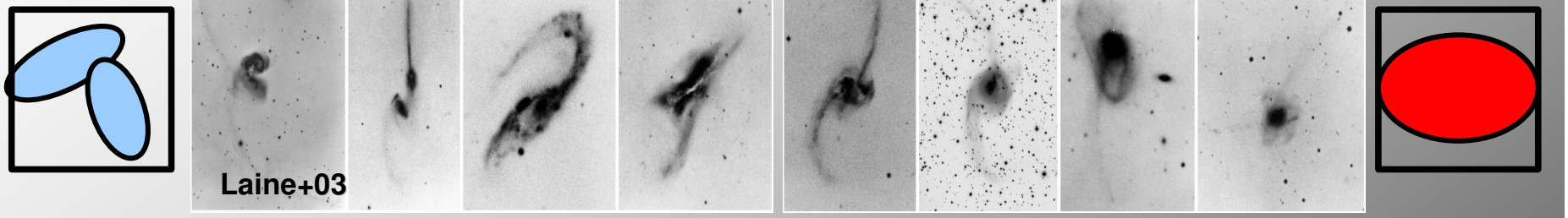
Note: Limiting magnitude due to observational merger fractions:
M(B)<-20 mag (⇒ ETGs with log(Mass/M_{sun}) > 10.7, Cimatti et al. 2006).

Eliche-Moral et al., ApJ submitted

II- Models
Merging procedure

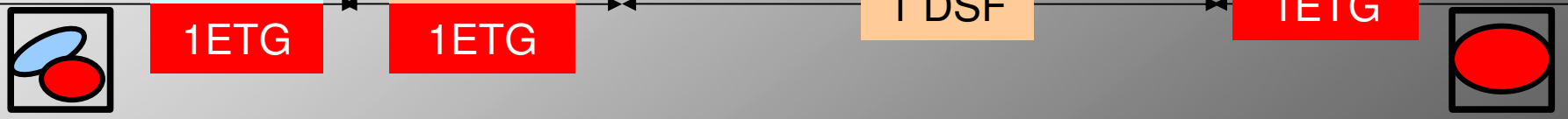
Wet merger

time → 2 Sc-Irr's → 2 DSFs → 1 DSF → 1ETG



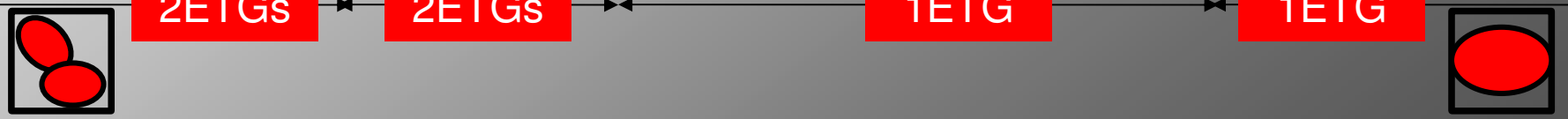
Mixed merger

time → 1 Sc-Irr / 1ETG → 1 DSF / 1ETG → 1 DSF → 1ETG

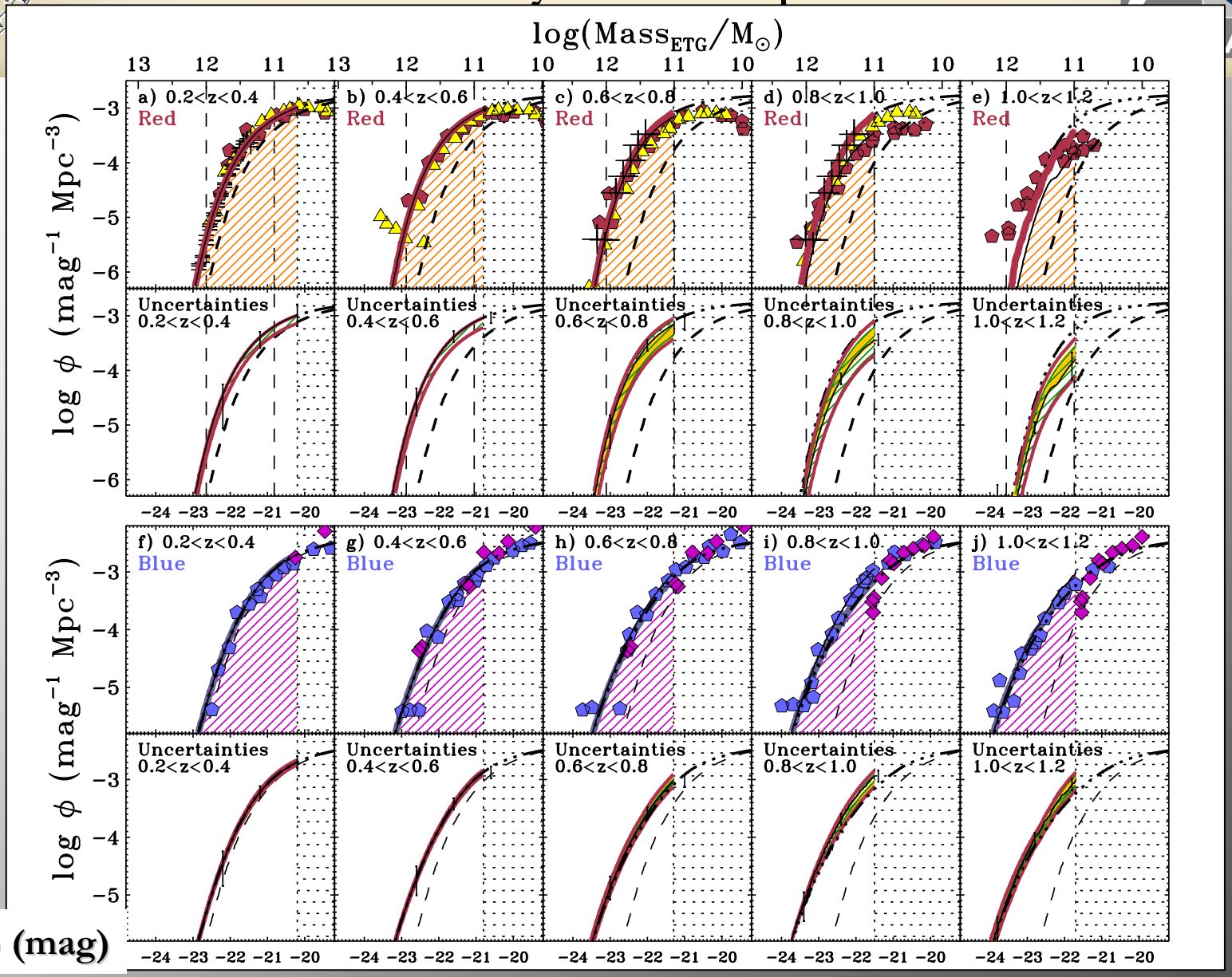


Dry merger

time → 2ETGs → 2ETGs → 1ETG → 1ETG



III- Results:
B-band LFs by color up to z~1



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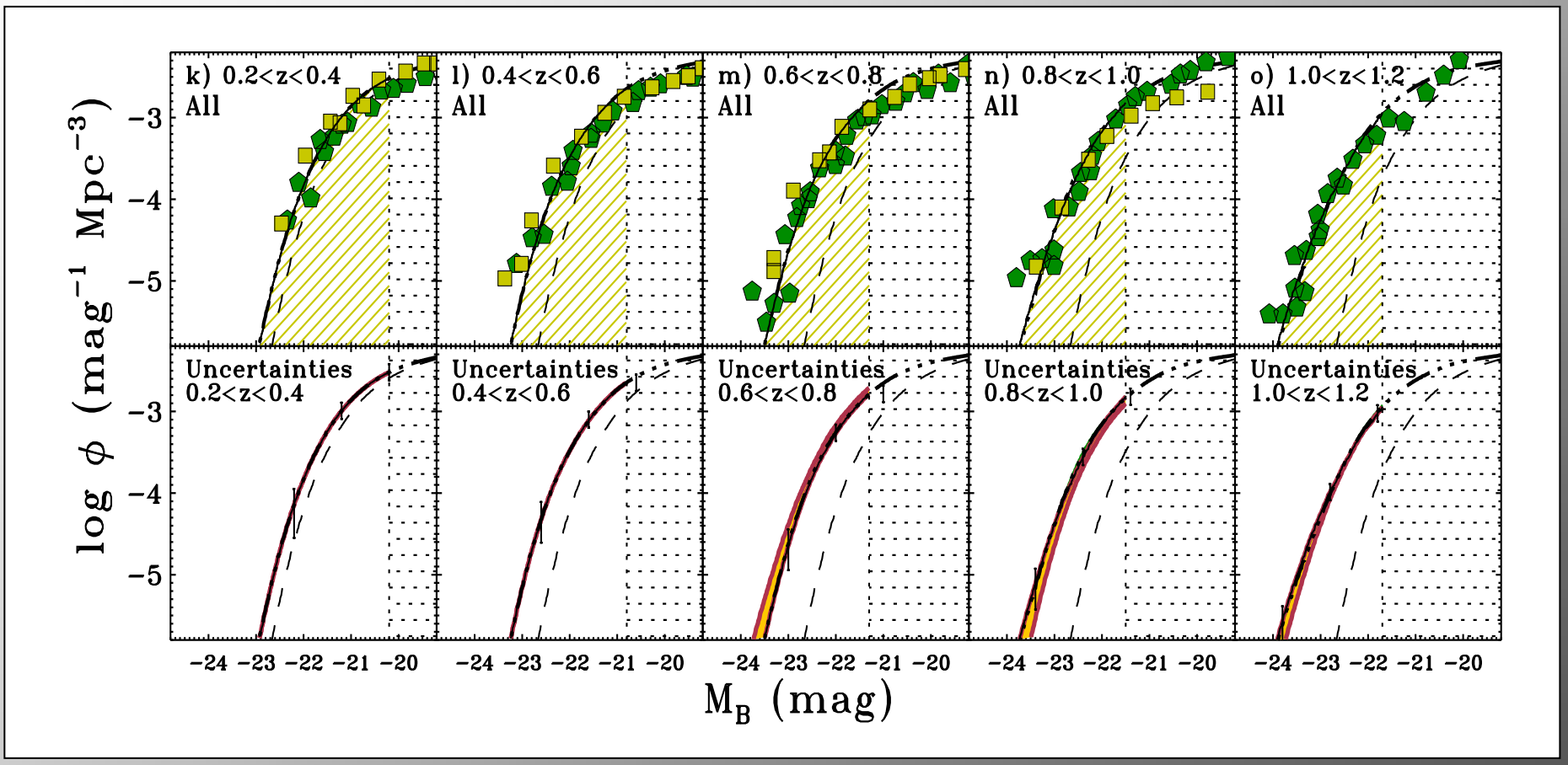
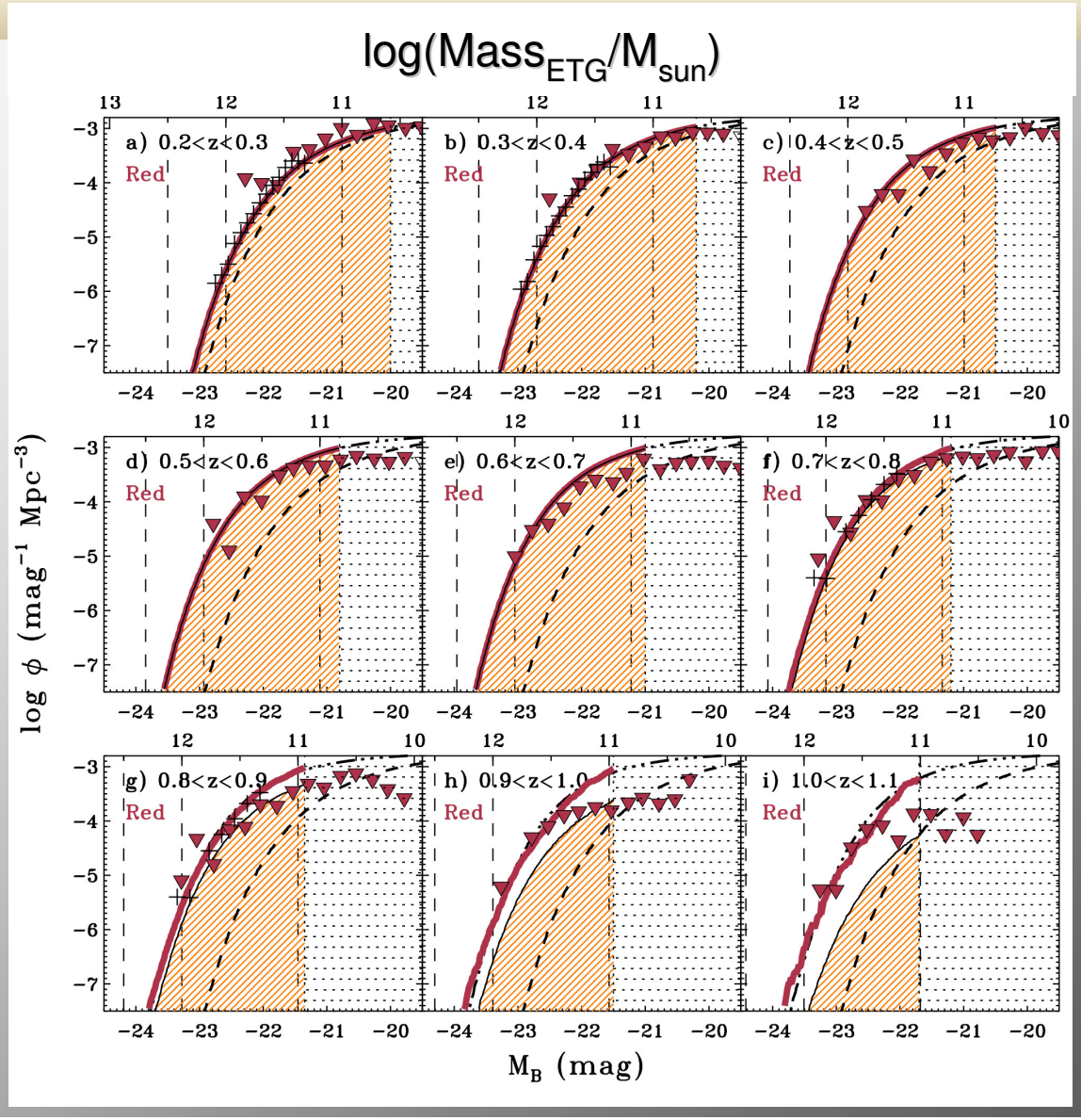
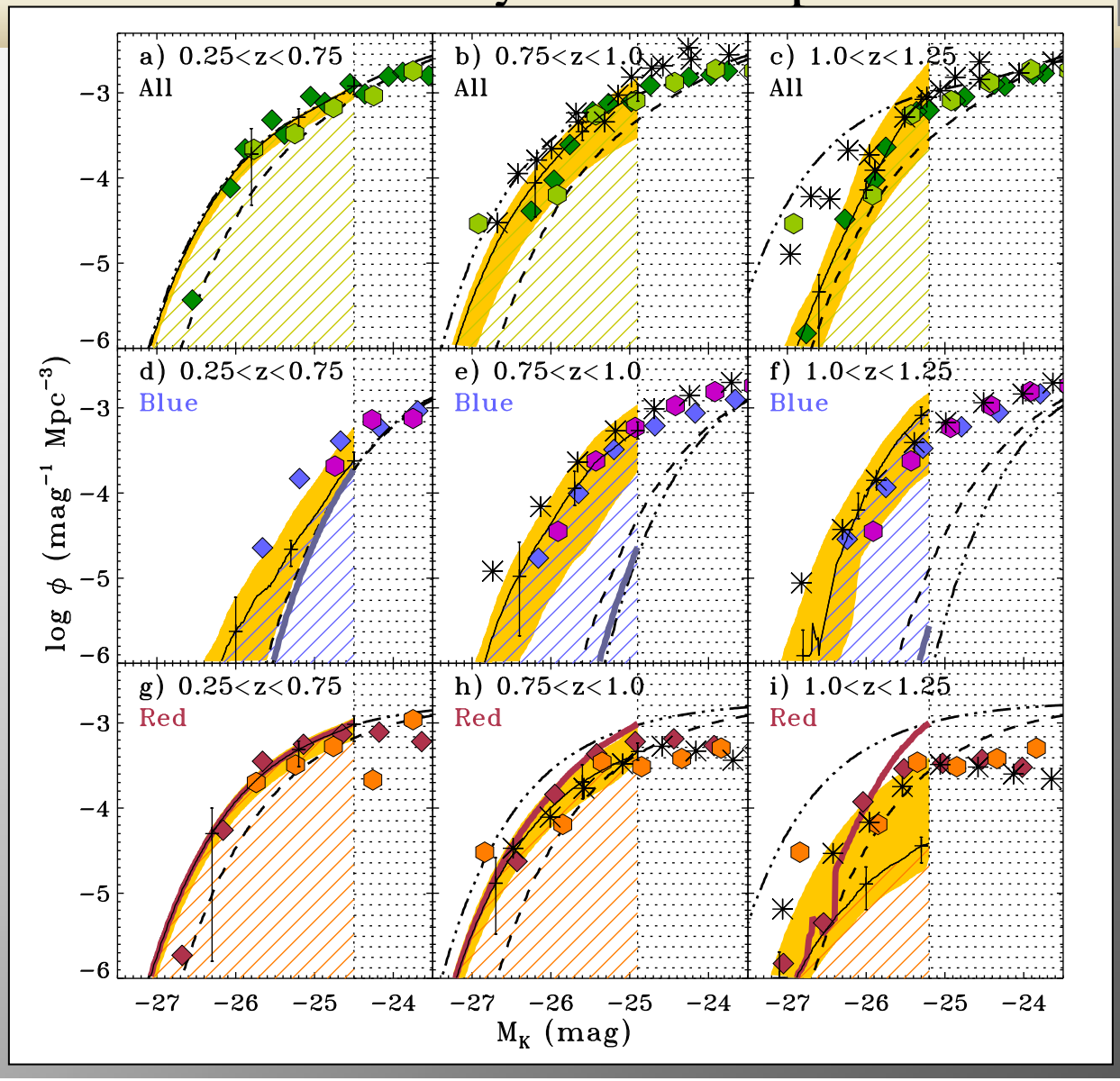
B-band LFs by color up to z~1



III- Results:
B-band LFs by color up to z~1

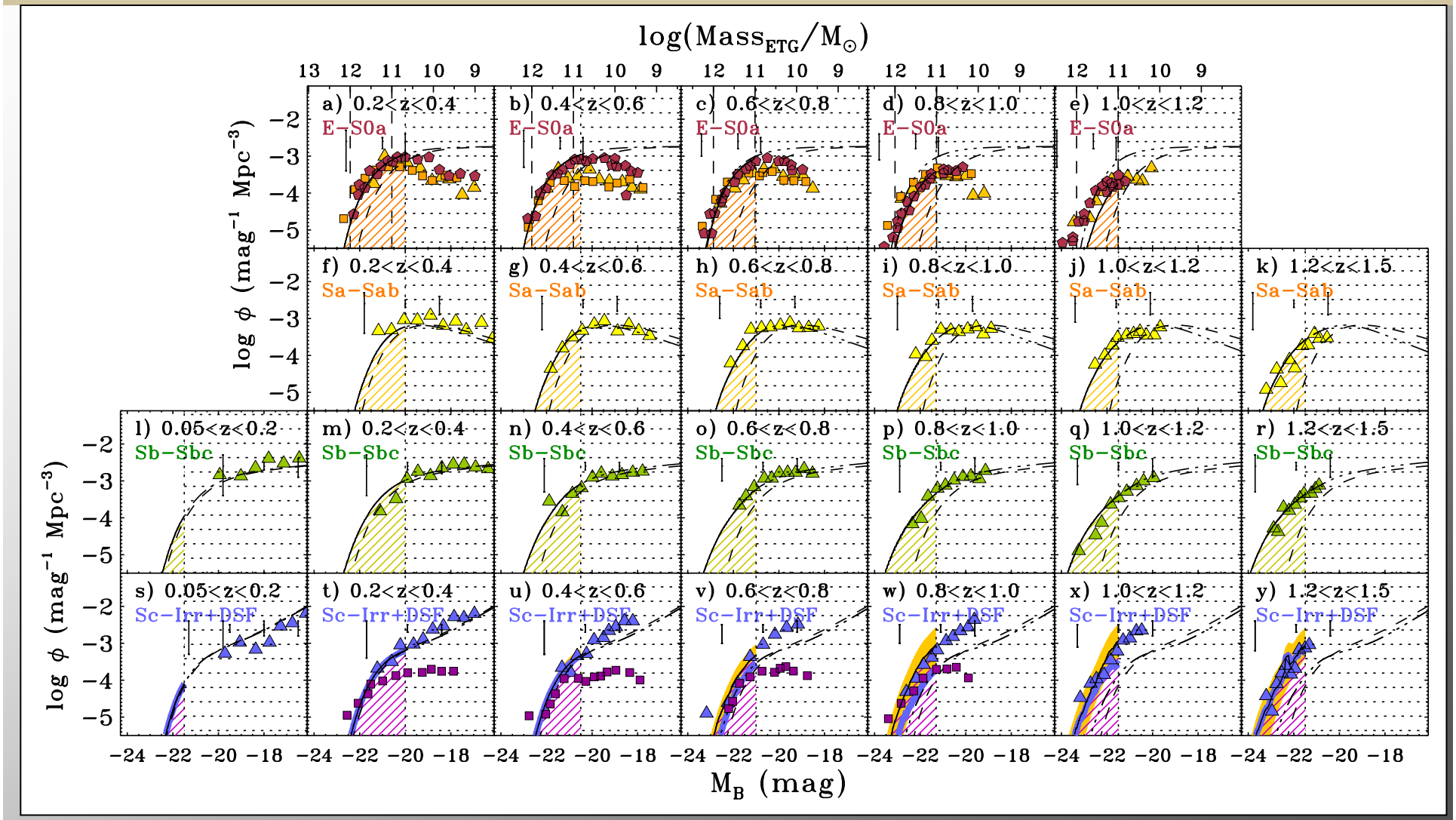


III- Results:
K-band LFs by color up to z~1



III- Results:

B-band LFs by morphology up to z~1



IV- Conclusions

1) The model **predicts the evolution of the observational LFs up to z~1** simultaneously in different bands, for different selection criteria on color and morphology.

2) It is feasible to **build up ~50-60% of present-day massive ETGs since z~ 1 through major mergers strictly reported by observations**. The predicted gas-rich progenitors explain naturally the blue galaxy excess at z>0.8.

3) It predicts observational **trends in agreement with mass-downsizing at z<1**, considering hierarchical assembly of ETGs. It provides a framework that reconciles different observational results on the LFs of red galaxies.

4) It also predicts that **z~0.8 is a transition epoch for this buildup**, and the appearance of a significant population of **DSFs at z>0.8**, in agreement with observations.

Major mergers must have been the main driver for the observed migration of mass from the blue galaxy cloud to the red sequence since z~1, for galaxy masses > 5×10^{10} M_{sun}.