

What aspects of galaxy environment matter?

Blanton & Berlind

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Outline

- Introduction
- Colors vs. group environment
- Colors vs. density field
- Group environment vs. the correlation function
- Conclusion

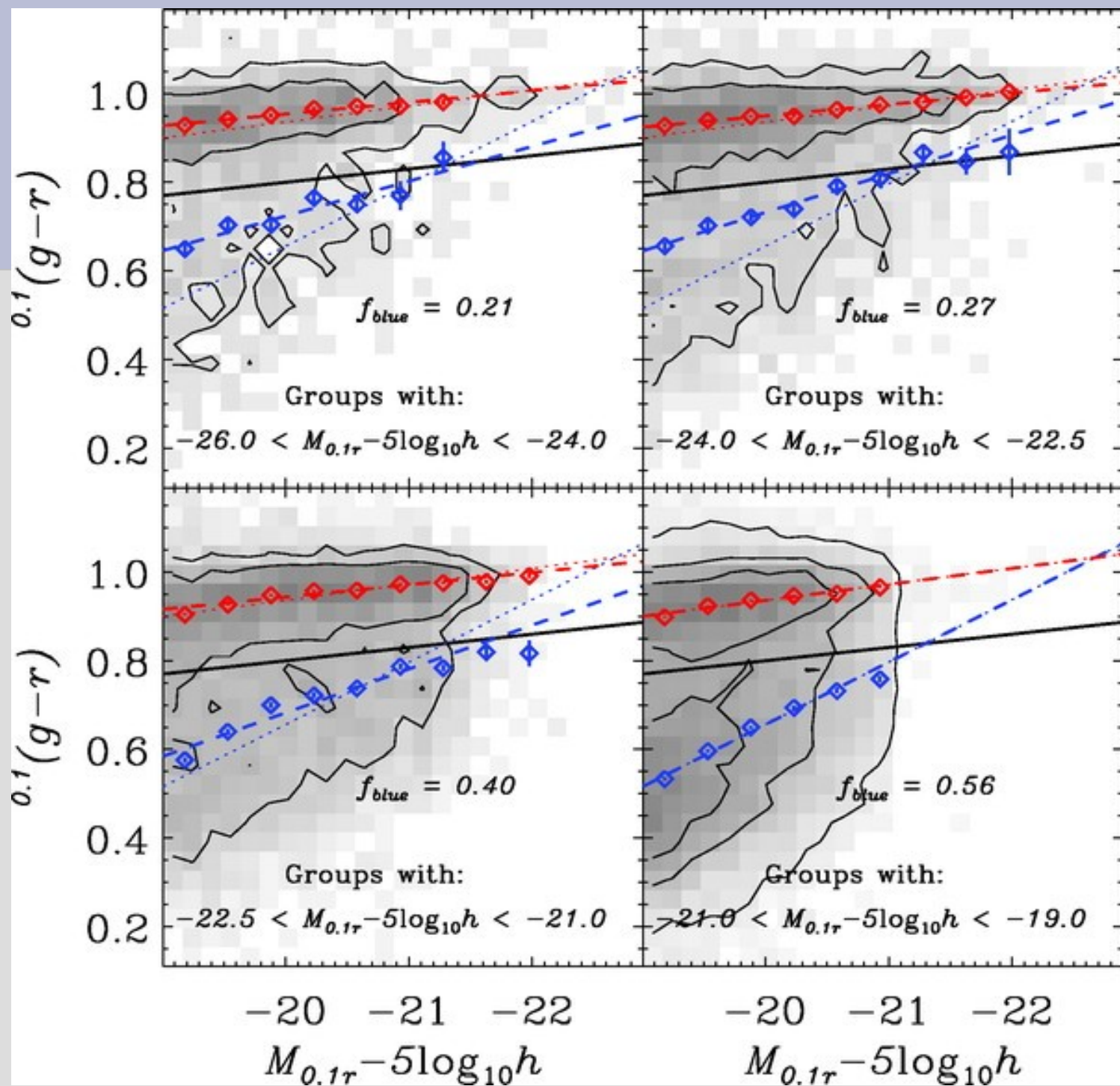
Introduction

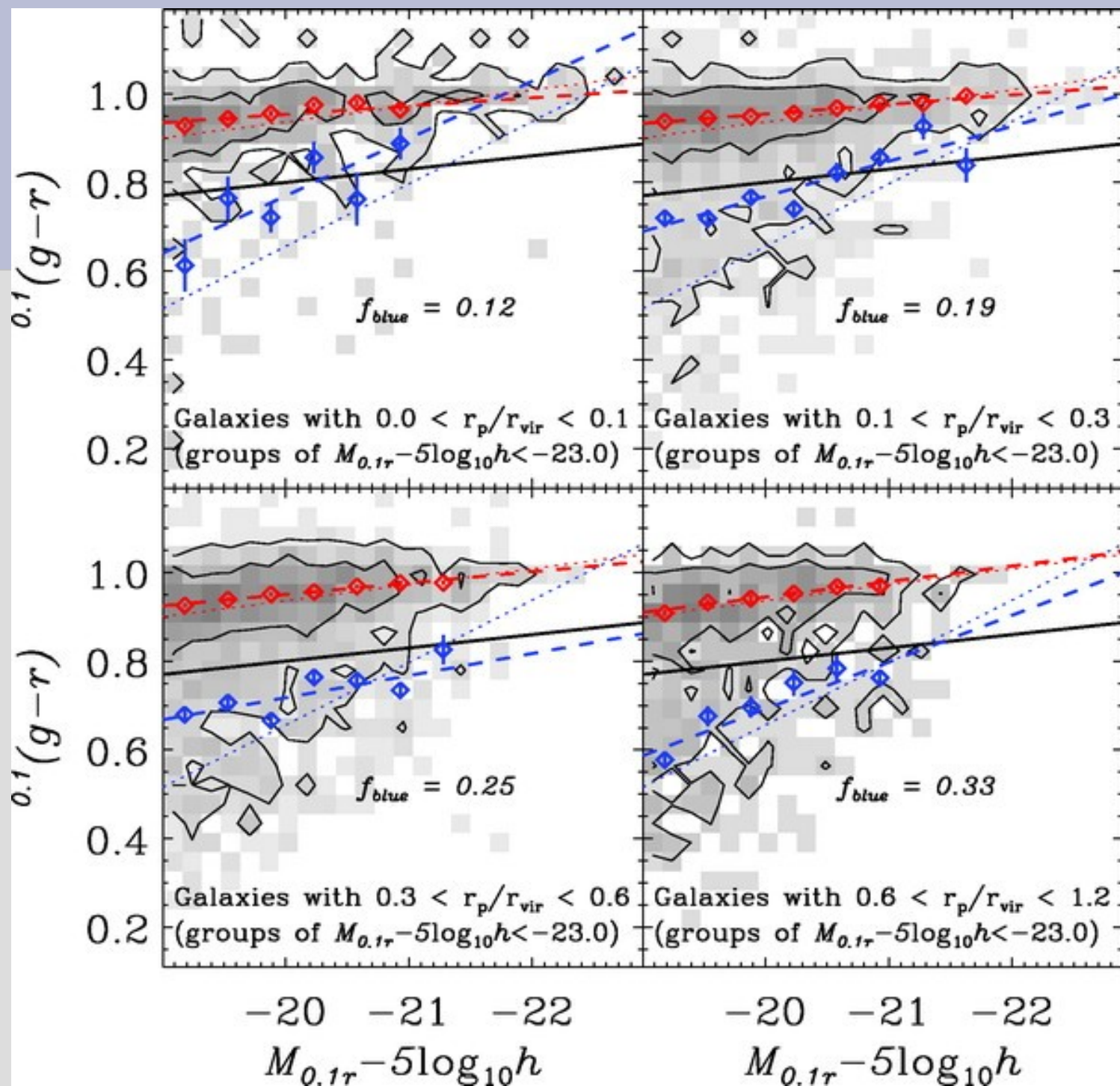
- Galaxy properties function of environment
- Important part in galaxy formation:
 - Why regions different initial conditions
 - > different galaxy populations
- What aspect environment most important
- In this paper:
 - Group environment
 - Surrounding density

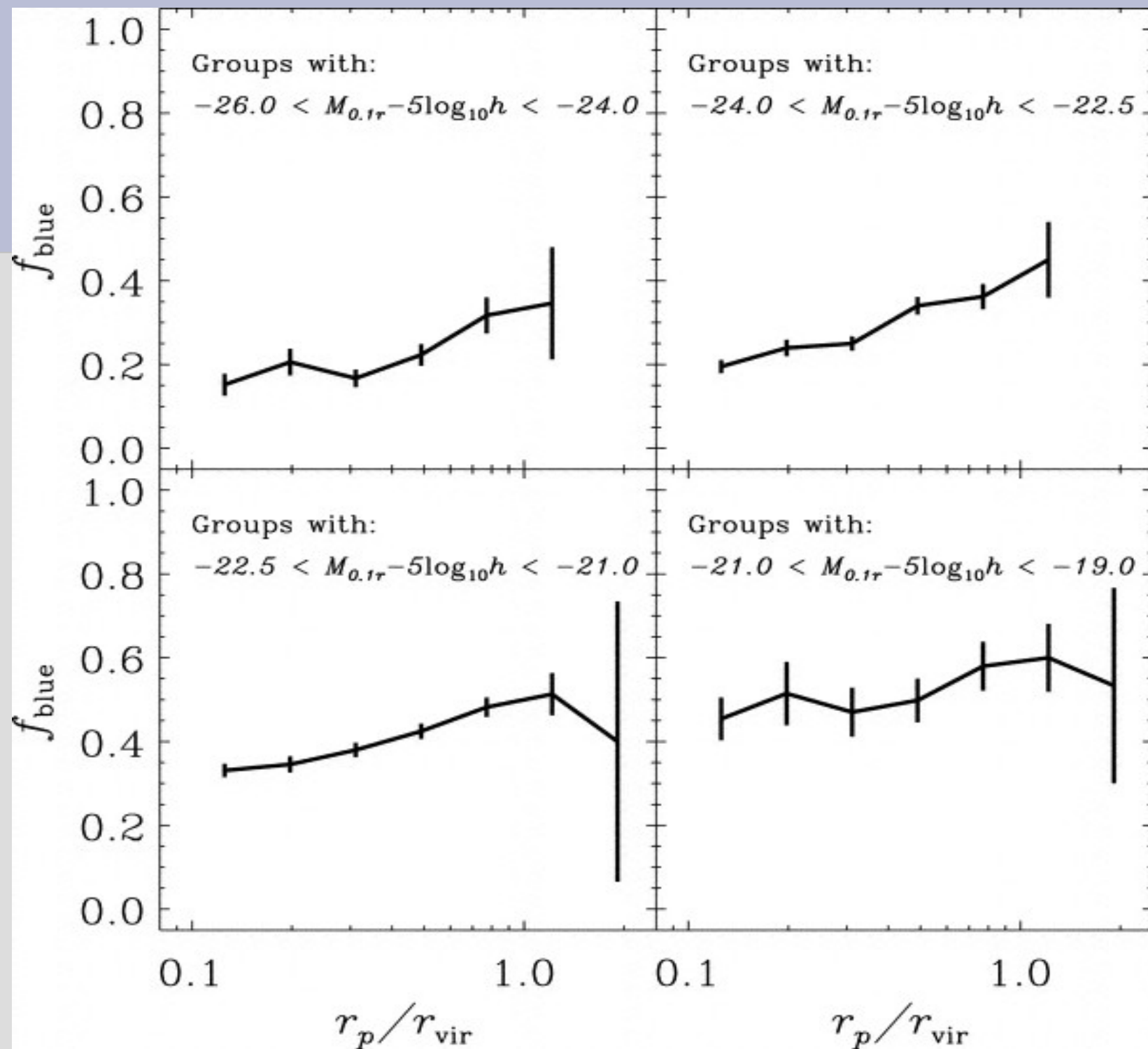
Introduction

- Halo Occupation Distribution (HOD)
 - Made assumption: galaxy properties depend only on group environment

Colors vs. group environment







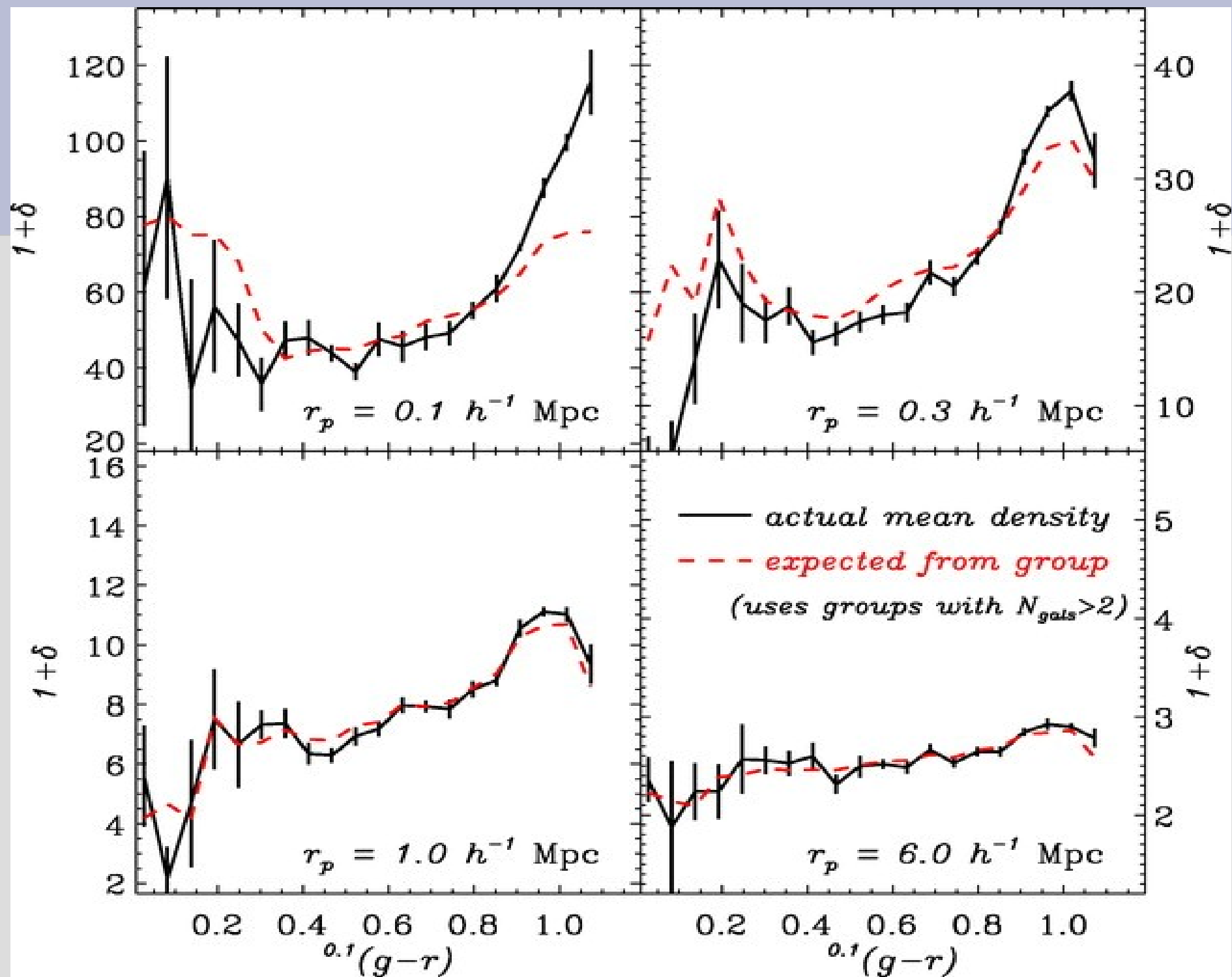
Color vs. group environment

- Galaxy colors strong function group luminosity
- For brighter group --> blue fraction less
- Dependence on groupocentric radius
- Blue fraction becomes larger with radius

Color vs. density field

Colors vs. density field

- Null-hypothesis: The color of the galaxy does not depend on the density field
- Measurement:
 - Cylinder with various annuli aligned with redshift

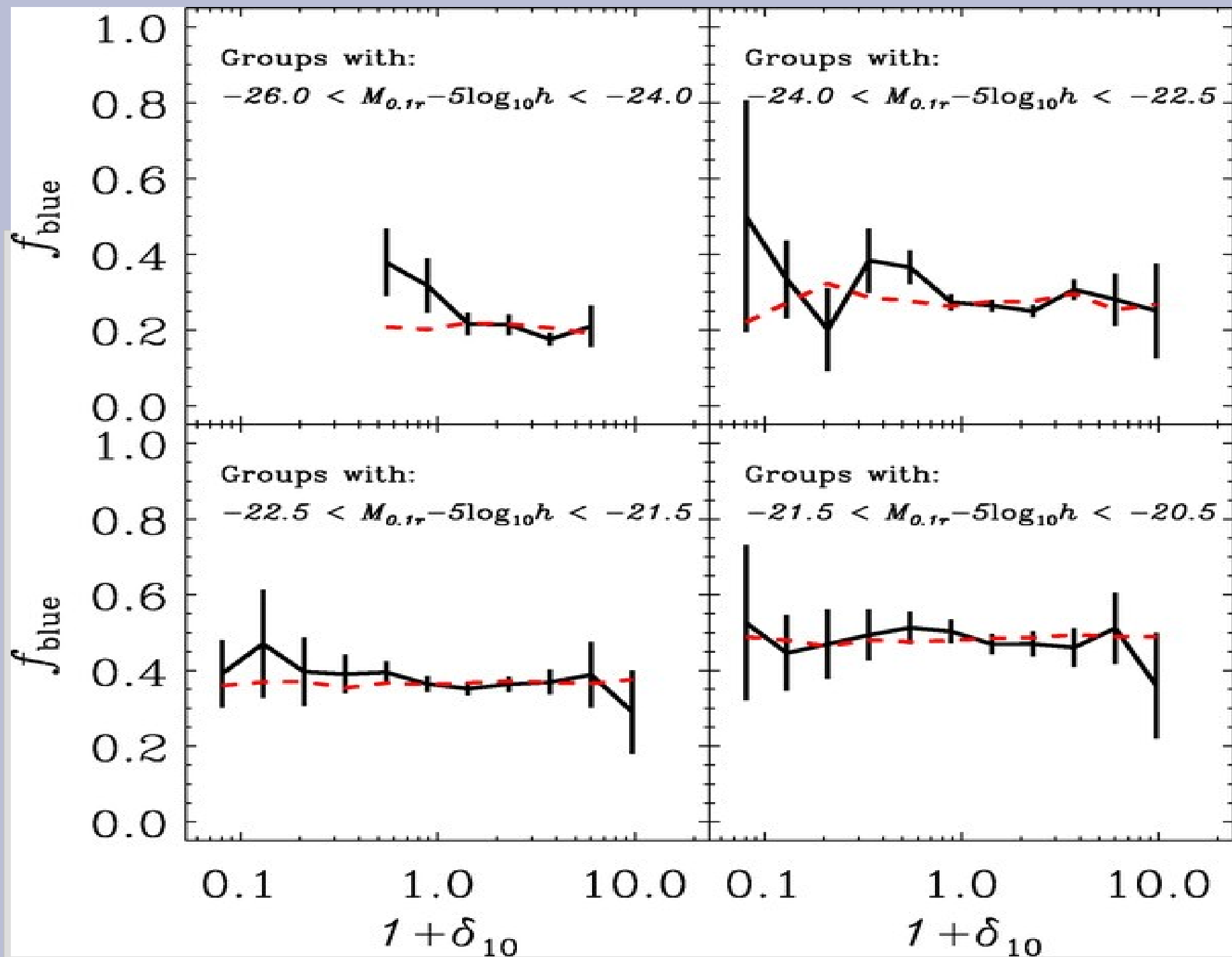


Color vs. density field

- Large scale:
 - Agree with null-hypothesis within 5%
- Small scale:
 - Variation w.r.t. null-hypothesis
 - Very red galaxies in higher density field

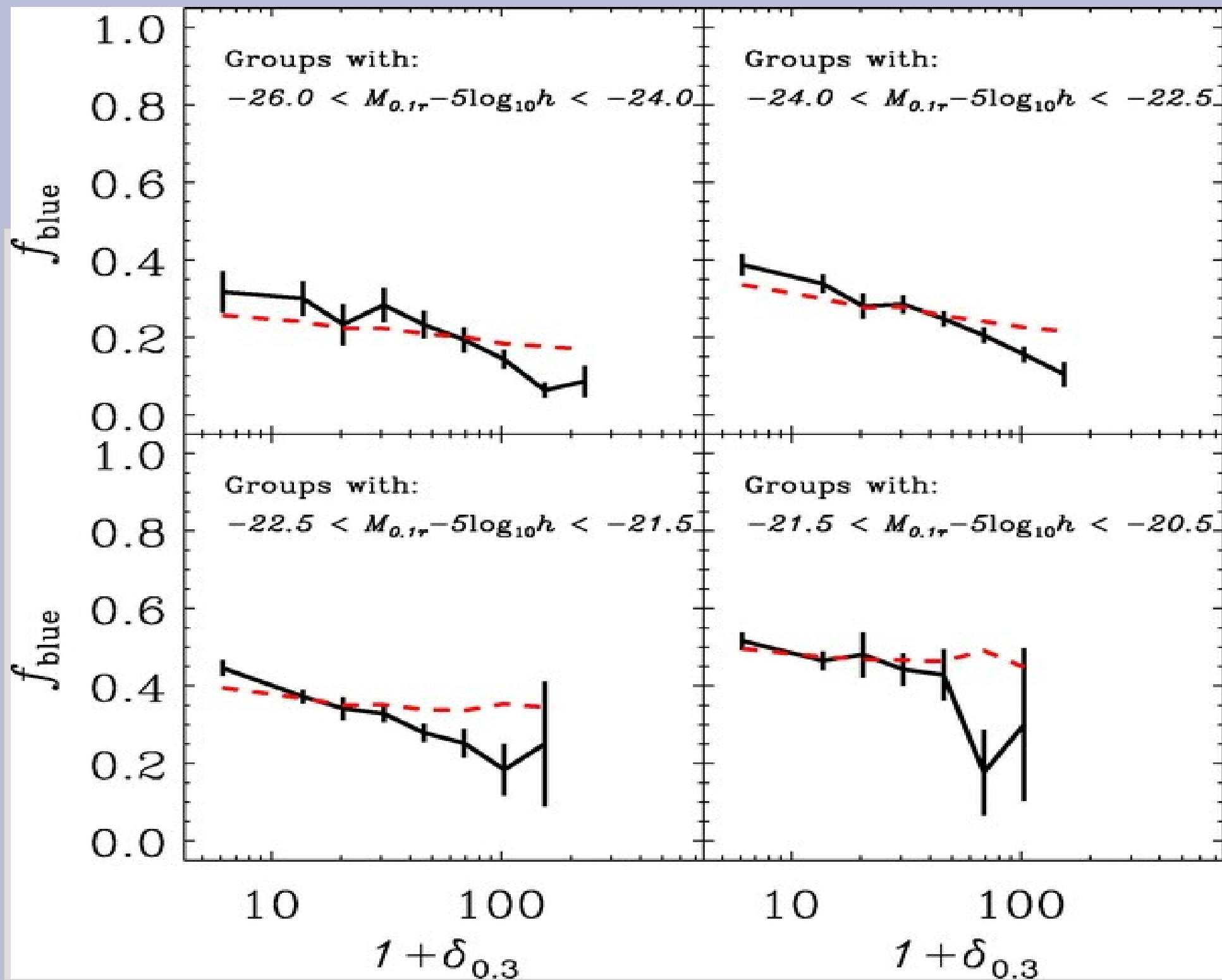
Color vs. density field

- Explanations for dependence density field on small scales:
 - Surviving substructure in groups from accretion smaller groups
 - Substructure have reddest population
 - Test group center inappropriate --> not the case
 - Making null-hypothesis not entirely correct



Color vs. density field

- Large scale:
 - Agree with null-hypothesis



Color vs. density field

- Small scale:
 - Dependence on small scale density field

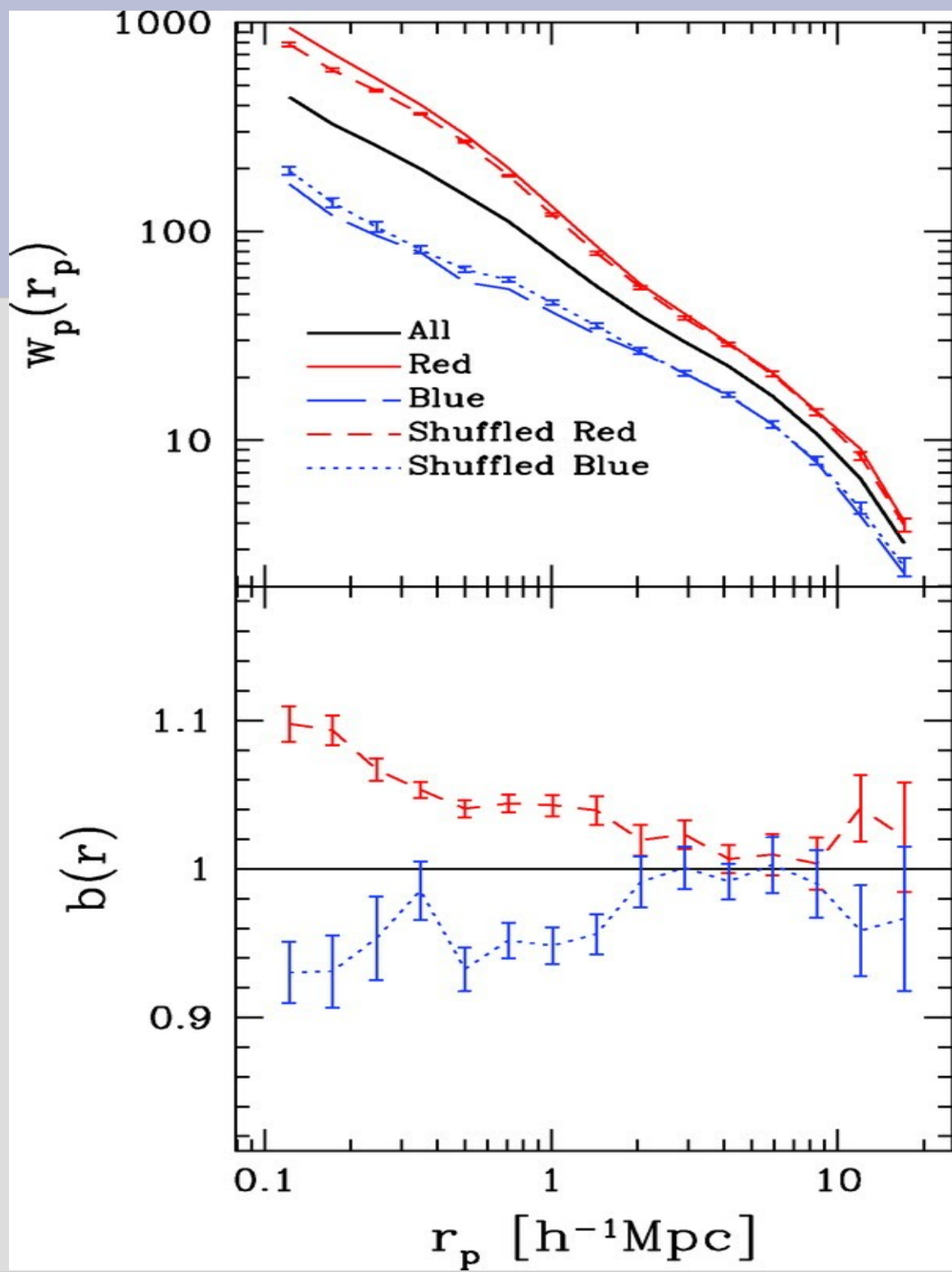
Color vs. density field

- Total density and blue fraction agree
- Large scale:
 - Agree with null-hypothesis
- Small scale:
 - Variation w.r.t. null-hypothesis
 - Very red galaxies in higher density field
 - Due to surviving substructure in groups from accretion smaller groups which has the reddest population

Group environment vs. correlation function

Group environment vs. correlation function

- Correlation function: Probability finding a galaxy at a distance r away from a given galaxy



Group environment vs. correlation function

- Agree on large scales, minor difference on small scales
- Blue --> smaller
- Red --> larger
 - Clumps on small scales redder population

Conclusion

- Color vs. group environment:
 - Brighter group --> blue fraction less
 - Color galaxy depend on group environment and groupocentric radius
- Color vs. density field:
 - Large scale: agree null-hypothesis
 - Small scale: difference due to:
 - Substructure with reddest population
 - Color galaxy does not depend on large scale density field

Conclusion

- Blue fraction: does agree with previous result
- On no scale density field is sufficient to explain the trends of galaxy colors with group environment
- Galaxy formation closely tied to group environment properties
- Correlation function differs little on small scale

Conclusion

- In combination with HOD:
 - Galaxy properties only depend on group environment seems to be good assumption

Questions?

**Reference, all images from Blanton & Berlind (2007),
ApJ, 664, 791**