Galaxy populations in rich and poor environments

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There are more galaxies, where there are less galaxies
• We use a luminosity-density field to estimate environments of galaxies on large, ~10 Mpc scales.
• Four density bins: 0<D<2 (voids), 2<D<4 (filaments), 4<D<6 (supercluster edges), and 6<D<8 (supercluster cores)
• Most galaxies are in small groups and low-density large-scale environments (Fig. 1).

How do the properties of clusters, groups, and galaxies depend on their large-scale environment?
• With the same group or cluster richness, but higher density large-scale environment:
  • The group/cluster is more luminous (Fig. 2).
  • Average color of galaxies is redder (Fig. 3).
  • The fraction of passive galaxies is higher (Fig. 4)
• Conclusion: The large-scale environment affects galaxies independently of group richness.

Fig. 1. Number of groups as a function of richness in the four large-scale density bins.

Fig. 2. Average luminosity of groups and clusters. Void groups are fainter than equally rich groups in superclusters.

Fig. 3. Average color of galaxies. The denser the large-scale environment, the redder the galaxies even with the same group richness.

Fig. 4. Fractions of passive and star-forming galaxies in small groups. Passive fraction grows higher in superclusters.