

MORPHOLOGY AND COLORS OF DISTANT GALAXIES

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ABSTRACT. We determine the correlation between spectral and morphological type for distant galaxies, defined by optical - near-infrared colors and image structure. As a point of departure, rest-frame colors of field galaxies observed to redshifts of 0.35 are shown to follow the trend in the UVK plane seen by Aaronson (1978) for local galaxies. Correlations are found between the deviations from this trend and absolute magnitude, compactness, and surface brightness. This work provides the foundation for investigations of galaxy structure at cosmologically interesting distances (Bershady, 1992).

1. Results

The distribution of measured ellipticity for red, or early spectral type galaxies is consistent with moderately elliptical to spherical systems. Late spectral type galaxies have an ellipticity distribution consistent with randomly oriented disks.

To first order, the gross dispersion in V-K for each spectral type, as well as the overlap between types can be parametrized by a linear color-magnitude (C-M) relation.

To second order, the C-M slope depends on galaxy spectral type, agreeing with results from studies of well resolved objects at lower redshift (Mobasher et al., 1986).

The sample contains a group of nearby, compact, dwarf galaxies, classified as late-type on the basis of their colors. Their distribution in the C-M diagrams implies, however, that they are early-type. Either the spectral classification is erroneous, or there is an additional parameter in the C-M relations, namely compactness.

The effects of dust reddening on the C-M relations are shown to be small, but measurable for galaxies of late spectral types.

References

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