

# Disks in Early-Type Dwarf Galaxies

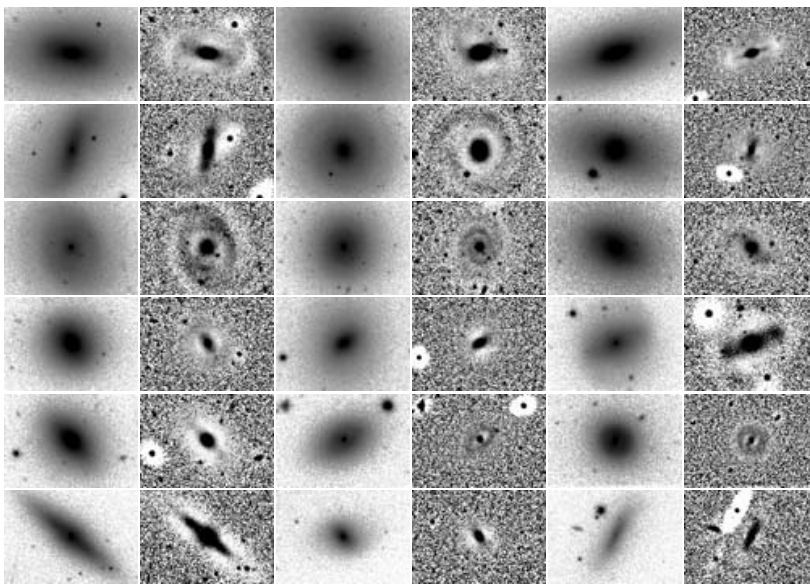
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**Abstract.** We identify disk features (spiral arms, bars, or edge-on disks) in a significant fraction of Virgo cluster early-type dwarfs. These galaxies are disk-shaped and are an unrelaxed cluster population that possibly formed out of infalling progenitors. Some display spiral arms with grand design features that cannot be the mere remainders of potential late-type spiral progenitors.

**Keywords.** Galaxies: dwarf, galaxies: structure, galaxies: clusters: individual (Virgo)

Based on the Virgo Cluster Catalog (VCC, Binggeli *et al.* 1985) and on optical images from the Sloan Digital Sky Survey (SDSS) Data Release 4 (Adelman-McCarthy *et al.* 2006), we performed a systematic search for disk features in Virgo cluster early-type dwarf (dE) galaxies (Lisker *et al.* 2006). We found unambiguous or possible disks in 41 of 476 certain or possible cluster member dEs by examining unsharp mask images (Fig. 1). These “dE(di)s” reach a number fraction of  $> 30\%$  among the brightest dEs. They are distributed in the cluster like spiral and irregular galaxies, implying recent infall.



**Figure 1.** Virgo cluster early-type dwarfs with disk features. For each galaxy, the combined image from three SDSS bands ( $g$ ,  $r$ , and  $i$ ) is shown (left), along with an unsharp mask image (right). The galaxies are, from left to right and from top to bottom: VCC 1010, 0523, 2048, 1949, 0308, 1183, 0490, 0856, 2019, 1947, 1695, 1896, 0990, 0216, 0278, 1304, 0336, 1204.

## References

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