

Workshop 5

1. Elliptical galaxies are classified according to their apparent ellipticity by the nearest integer to
$$10 \frac{(a - b)}{a}$$

where a is the major axis and b the minor axis of the ellipse. The class is designated by E followed by this integer.

Spirals (S) are classified by:

- the relative size of the bulge,
- the amount of dust and gas,
- the tightness of the spiral arms

Sa galaxies have a large bulge, small disc and tight spiral arms and little gas & dust

Sc galaxies have a small bulge, large disc and loose spiral arms and lots gas & dust

Sb are intermediate

Barred spirals (SB) have an equivalent classification going from SBa to SBc with the bulge and bar being dominant in class 'a' and progressively less so towards class 'c'

S0 galaxies are intermediate between elliptical and spiral galaxies.

Classify the eight galaxies of different types provided.

2. Estimate the average percentage of ellipticals, spirals and irregulars for the Virgo cluster from the image provided. You do not need to classify them fully – just whether they are E, S or Irr. Please do not draw or mark the images - they will be needed by other classes. Start with the brighter galaxies and work towards the fainter ones. Try to classify at least 10 galaxies to get good statistics.
3. Estimate the average percentage of ellipticals, spirals and irregulars in part of the Hubble Ultra-Deep Field image provided. Compare to that in the Virgo cluster and comment.