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PROPERTIES OF BARS IN SPIRAL GALAXIES FROM COSMOS

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In this work we present the analysis of 760 spiral galaxies from COSMOS using both visual inspection and analysis of the radial profiles. In this way we have determined some criteria for a semiautomatic classification.

The presence and the evolution of barred spiral galaxies and their properties are important to the understanding of galaxy formation and evolution. Structural components like radius, ellipticities and strength of the bar can be measured by analyzing the photometric profiles. We have studied with visual inspection and ellipse fitting 760 disk galaxies from COSMOS, previously classified as barred by Sheth et al. (2008). The sample is over $0.2 < z < 0.84$.

The visual classification was done in three groups: SB, SAB and SA, depending of the clearness in which we can distinguish the bar. We measured the semi-major axis of the bar (SMA, which we called the bar size) with ds9. The sample was analyzed with the same procedure for the bar presence and size determination, following our extended criteria from Marinova & Jogee (2007): (1) The e as function of radius increases to a global maximum $e_{\rm bar}$ greater than 0.25, while PA remains relatively constant. (2) As well as e, the harmonics increase to a global maximum. (3) The e and B_4 changes abruptly at the end of the bar, and the PA changes at the transition region from the bar to the disk. We have measured the radius at maximum e, max B_4, max A_4, max $\sqrt{(B_4^2 + A_4^2)}$, max PA and the jumps in e and B_4 and compare them with the visual measures SMA (Figures 1 and 2).

The measure of the length of the bar, as well as their classification, is not a simple process, and can not be simplified to a single method, such as visual inspection or analysis of the radial profiles. We found that the values determined by visual inspection and radial profile differ from each other, especially for bars that are not prominent. However, the determination of the maxima in the profiles gives us an upper limit on the size of the bar. This overestimation might be explained by the low resolution of the images. Since ellipse fitting can not distinguish when the bar ends and the arms start, some of the profiles show maxima beyond the region of the bar. We are currently analyzing the evolution and classification of barred galaxies over redshift, to determine if there is any effect due to z.

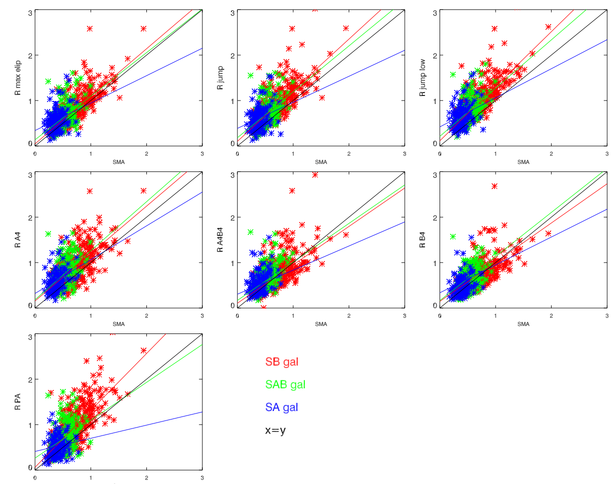

Fig. 1. Correlation of R from profiles vs SMA for projected galaxies.

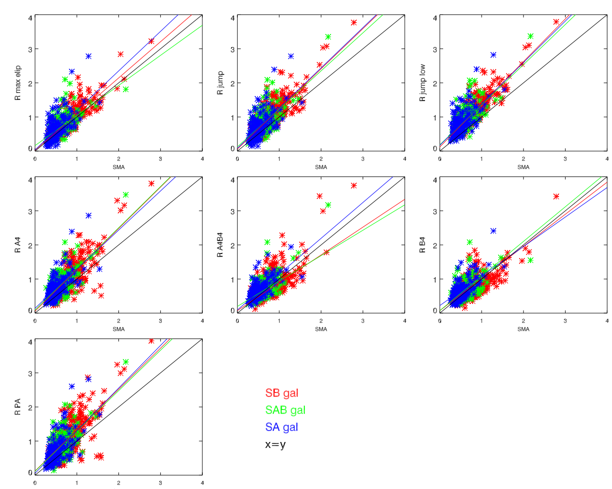

Fig. 2. Same as Figure 1 for deprojected galaxies.

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