



PHYSICS AND ASTRONOMY SEMINAR

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“Structure and Formation of S0 and Spheroidal Galaxies”

Abstract

This talk emphasizes the importance of environmentally driven secular evolution of galaxies. I present observational evidence that Sph galaxies such as Fornax and NGC 205 are bulgeless S0 galaxies. Both are late-type galaxies that have been transformed into gas-free, "red and dead" galaxies by a variety of internal and environmental processes.

I update Sidney van den Bergh's parallel sequence galaxy classification in which S0 galaxies form a sequence S0a-S0b-S0c that parallels the sequence Sa-Sb-Sc of spiral galaxies. The ratio B/T of bulge to total light defines the position of a galaxy in this tuning fork diagram. This classification makes one major improvement. I extend the S0a-S0b-S0c sequence to spheroidal (Sph) galaxies that are positioned in parallel to irregular galaxies in a similarly extended Sa-Sb-Sc-Im sequence. This provides a natural home for spheroidals, which once were thought to be low-surface-brightness ellipticals.

To motivate the juxtaposition of spheroidals and irregulars, I present photometry and bulge-disk decompositions of late-type S0s that bridge the gap between the more common S0b and Sph galaxies. Several S0s in the Virgo cluster have $B/T \leq 0.1$. They are the S0cs that were missing from van den Bergh's paper.

I update the structural parameter correlations of Sph, spiral, irregular, and elliptical galaxies. This shows that spheroidals of increasing luminosity form a continuous sequence with the disks (but not bulges) of S0c-S0b-S0a galaxies. Remarkably, this Sph-S0-disk sequence is almost identical to that of irregular and spiral galaxies. I review the evidence for a variety of physical processes which transform gas-rich, star-forming S+Im galaxies into gas-poor S0+Sph galaxies.

Tuesday, November 3, 2015

3:00 p.m.

Elliott Building

Room 160