

Galaxy Bulges in Clusters: formation and evolution to $z \sim 1$

Principal Investigator: Dr. Yogesh Wadadekar

Institution: Space Telescope Science Institute

Electronic Mail: wadadekar@stsci.edu

Scientific Category: UNRESOLVED STELLAR POPULATIONS

Scientific Keywords: CLUSTERS OF GALAXIES, GALAXY BULGES, GALAXY FORMATION AND EVOLUTION

Total Budget Amount: \$60,000

Abstract

The likely existence of two fundamentally distinct classes of galactic bulges - old, metal-enriched, and following a $R^{1/4}$ profile, vs. young, exponential, and possibly less metal-enriched - has recently emerged as a very important clue to the formation history of nearby galaxies of different Hubble types and luminosities. We propose to take advantage of archival HST data to extend the study of the duality in bulge properties beyond the local Universe, specifically to a sample of about 40 galaxy clusters at $0.2 < z < 0.9$ with deep WFPC2 or ACS observations.

Understanding how - and when - bulges and ellipticals formed in clusters, and how their properties relate to those of galaxies in the local Universe, will help answer fundamental questions about galaxy formation in clusters and in the field. If exponential bulges form through secular evolution, they should be rarer and fainter at higher redshifts; if $R^{1/4}$ bulges form in burst at high redshift, their number, size, and color should evolve accordingly. We will address this question by quantitatively estimating structural parameters for the bulge and disk using analytic 2-D fits to the galaxy images using a bulge-disk decomposition code independently developed by the PI. We expect to obtain these measurements for about 1000 bulges and ellipticals to $I=23$ in about 40 available clusters with deep high resolution HST observations. We will also be able to understand the impact on bulge evolution of mergers, through the incidence of disturbed morphologies, and of the local environment, via correlations with cluster richness and position within the cluster. A companion project, recently started by two co-investigators (and for which no funding is requested), will address similar questions for field galaxies in the GOODS survey.

Investigators:

	Investigator	Institution	Country
PI	Dr. Yogesh Wadadekar	Space Telescope Science Institute	USA/MD
CoI	Dr. Stefano Casertano	Space Telescope Science Institute	USA/MD
CoI	Prof. Ajit Kembhavi	Inter-University Centre for Astronomy and Astrophysics	India
CoI	Mr. Abhishek Rawat	Inter-University Centre for Astronomy and Astrophysics	India

Number of investigators: 4