Hubble Space Telescope

Cycle 16 AR Proposal

Sizes and Morphology of z=3.1 Lyman Alpha Emitting Galaxies in the Extended CDF-S

Principal Investigator: Dr. Eric Gawiser

Institution: Rutgers the State University of New Jersey

Electronic Mail: gawiser@physics.rutgers.edu

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Abstract

Lyman Alpha Emitting galaxies (LAEs) seen at high redshift appear to be galaxies in the act of formation. They are currently the most promising candidates for the progenitors of typical spiral galaxies like the Milky Way. The LAEs tend to be younger, lower in mass, and less chemically evolved than the better-studied Lyman Break Galaxies (LBGs). Wide-field ACS imaging allows us to study the physical properties of these objects at kpc scales to gain a better understanding of the interconnected processes of mergers and star formation that play fundamental roles in galaxy formation.

We will use archival ACS images of the Extended Chandra Deep Field-South from GEMS, GOODS, and UDF to study the size and morphology of our sample of 162 Lyman Alpha Emitters at z=3.1, 47 of which have confirmed spectroscopic redshifts. We will perform the identical analysis on a sample of 34 spectroscopically confirmed Lyman Break Galaxies at $2.7<z<3.9$ to compare the physical properties of these two families of high-redshift galaxies. At this redshift, the ACS F606W and F850LP bands trace the rest-frame ultraviolet radiation from ongoing star formation.

We will determine parametric measures of morphology (Sersic radii, CAS parameters, Gini coefficient, M20) along with non-parametric measures (half-light radii, number of star-forming clumps, size and separation of clumps) to provide critical constraints upon models of galaxy formation. We will use the objects that lie in the deeper GOODS and UDF regions to model uncertainties in the GEMS results. We will correct the astrometric zeropoints of the GEMS images and reproject them to match the standard GOODS/MUSYC pixelization scheme for this field and will offer these images to the community via the HST archive.

Investigators:

	Investigator	Institution	Country
PI	Dr. Eric Gawiser	Rutgers the State University of New Jersey	USA/NJ
CoI	Dr. Caryl Gronwall	The Pennsylvania State University	USA/PA
CoI	Dr. Robin Ciardullo	The Pennsylvania State University	USA/PA
CoI	Dr. John J. Feldmeier	Youngstown State University	USA/OH
CoI*	Mr. Kevin Schawinski	University of Oxford	UK
CoI	Dr. Leopoldo Infante	Universidad Catolica de Chile	Chile
CoI	Dr. Paulina Lira	Universidad de Chile	Chile

Number of investigators: 7

* ESA investigators: 1

Dataset Summary:

Instrument	No. of Datasets	Retrieval Method	Retrieval Plan
ACS	3	FTP	GEMS, GOODS, and UDF images already accessible to PI and co-Is on spinning disk, publicly available from HST archive