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Education:

2003	Arizona State University	Ph.D. in Physics (GPA 3.8/4.0)
1992	SUNY College at Geneseo	B.A. in Physics and Math (GPA 3.7/4.0)

Experience:

2003	Arizona State University	Postdoc (w/ Windhorst)
Spring 2003	Mesa Community College	Adjunct Faculty (Physical Science)
1997-2003:	Arizona State University	Graduate Research Assistant
1992-1997, 2003	Arizona State University	Graduate Teaching Assistant
1991	SUNY College at Geneseo	Undergrad. Teaching Assistant

Memberships/Awards:

1998-2000,2003:	NASA Space Grant Grad. Fellowship	NASA/ASU
1997-present:	American Astronomical Society (USA)	
1992-1994:	GAANN Fellowship	DOE/ASU

Refereed Papers

(1) "Evidence for Large-Scale Structure at z$\simeq$2.4 From Lyα Imaging"
Keel, W. C., **Cohen, S. H.**, Windhorst, R. A., & Waddington, I. 1999, AJ, 118, 2547

(2) "NICMOS Imaging of the Dusty Microjansky Radio Source VLA J123642+621331 at z=4.424"
Waddington, I., Windhorst, R. A., **Cohen, S. H.**, Partridge, R. B., Spinrad, H. & Stern, D. 1999, ApJ, 526, L77

(3) "Young and Old Galaxies at High Redshift"
Windhorst, R. A., Odewahn, S. C., Burg, C., **Cohen, S.**, & Waddington, I. 1999, Ap&SS, 269, 243

(4) "Automated Galaxy Morphology: A Fourier Approach"
Odewahn, S. C., **Cohen, S. H.**, Windhorst, R. A., & Philip, N. S. 2002, ApJ, 598, 539

(5) "Old elliptical galaxies at $z \simeq 1.5$ and the Kormendy relation"
Waddington, I., Windhorst, R. A., **Cohen, S. H.**, Dunlop, J. S., Peacock, J. A., Jimenez, R., McLure, R. J., Bunker, A. J., Spinrad, H., Dey, A., Stern, D. 2002, MNRAS, 336, 1342

(6) "A Simple Prediction of the Surface Density of Galaxies at $z \simeq 6$"
Yan, H., Windhorst, R. A., Odewahn, S. C., **Cohen, S. H.**, Rottgering, H. J. A., Keel, W. C., ApJ, 2002, 580, 725

(7) "Searching for $z \sim 6$ Objects with the HST Advanced Camera for Surveys: Preliminary Analysis of a Deep Parallel Field"
Yan, H., Windhorst, R. A., **Cohen, S. H.**, 2003, ApJL, 585, L93

(8) "The Infrared Counterparts of the Optically Unidentified CDF-S 1Ms Sources"
Yan, H., Windhorst, R. A., Rottgering, H. J. A., **Cohen, S. H.**, Odewahn, S. C., Chapman, S. C., Keel, W. C., 2003, ApJ, 585, 67

(9) "The Hubble Space Telescope WFPC2 B-band Parallel Survey: A Study of Galaxy Morphology for Magnitudes $18 \leq B \leq 27$"
Cohen, S. H., Windhorst, R. A., Odewahn, S. H., Burg, C. A., & Driver, S. P. 2003, AJ, 125, 1762

(10) "The Morphological Decomposition of Abell 868"
Driver, S. P., Odewahn, S. C., Echevarria, L., **Cohen, S. H.**, Windhorst, R. A., Phillips, S., & Couch, W. J. 2003, AJ, , 126, 2662

(11) "The Luminosity Function Normalization and the Faint Galaxy Counts"
Cohen, S. H., et al. 2003, in preparation.

Other Significant Papers

(12) "The HST WFPC2 B-Band Parallel Survey"
Cohen, S. H., Windhorst, R. A., Burg, C. A. T. C., Odewahn, S. C., Driver, S. P., de Jong, R. S., Marzke, R. O., Tyson, J. A., & Dell'Antonio, I. 1997, BAAS, 29, 1209 (Abstract 3.14)

(13) "The HST/WFPC2 B-band Galaxy Counts vs. Type for $19 \lesssim B \lesssim 2$ 9 mag"
Windhorst, R. A., Odewahn, S. C., **Cohen, S. H.**, Burg, C. A., deJong, R. S. , Driver, S. P., Marzke, R. O., Tyson, J. A., & Dell'Antonio, I. 1997 in "The Ultraviolet Universe at Low and High Redshift: Probing the Progress of Galaxy Evolution", Eds. W. H. Waller, M. N. Fanelli, J. E. Hollis, & A. C. Danks, Vol. 408, p. 242-246, (New York: AIP Press)

(14) "Results from Parallel and Other Deep HST Surveys: Galaxy Counts vs . Type for $19 \lesssim B \lesssim 29$, & Galaxy Formation from Sub-galactic Clumps"
Windhorst, R., Pascarelle, S., Odewahn, S., **Cohen, S.**, Burg, C., Keel, W., & Driver, S. 1998 in Proceedings of the STScI Symposium on "The Hubble Deep Field", Eds. M. Livio, S. M. Fall, & P. Madau (Cambridge University Press),481-505

(15) "Clues to Galaxy Formation and the Role of Mergers from Deep HST Images"
Windhorst, R. A., **Cohen, S. H.**, & Waddington, I. 1999, in the 9^{th} Annual October Astrophysics Conference in Maryland on "After the Dark Ages: When Galaxies Were Young (the Universe at 2<z<5)", AIP Conf. Proc. Vol. 470, Eds. E. P. Smith and S. S. Holt (New York: American Institute of Physics), p. 202–215

(16) "Structure and Content of the 53W002 "Cluster" at $z = 2.4$"
Keel, W. C., Wu, W., Windhorst, R. A., **Cohen, S. H.**, Waddington I. & Pascarelle, S. 2000, in Proceedings of the UC Berkeley Conference on "The Hy-Redshift Universe: Galaxy Formation and Evolution at High Redshift", A. J. Bunker & W. J. M. van Breugel, ASP Conf. Ser. Vol. 193 (Provo, UT: Brigham Young University), p. 419–422

(17) "The Brighter Side of Faint Galaxy Morphology"
Cohen, S., Odewahn, S., & Windhorst, R. 2000, BAAS, 197 (Abstract 134.13)

(18) "A Fourier-based Method for the Automated Morphological Classification of Galaxies"
Odewahn, S.,**Cohen, S.**, & Windhorst, R. 2000, BAAS, 197 (Abstract 77.01)

(19) " Object Sizes from Reionization to the Present, and the Natural Confusion Limit Expected from Ultradeep Surveys"
Windhorst, R., **Cohen, S.**, Jansen, R., Odewahn, S., Driver, S., Kawata, D., Gibson, B., Gardner, J. P., & Hopkins, A. 2002, AAS, 201, 32.07

(20) "Searching for z=6 Objects with Deep ACS/WFC Parallel Observation"
Yan, H., Windhorst, R. A., & **Cohen, S. C.** 2002, BAAS, 201 (Abstract 149.04)

(21) "Fundamental Limitations to the Observability of the Outskirts of Galaxies at High Redshifts: The Natural Confusion limit in Ultradeep Optical–IR and Radio Surveys"
Windhorst, R. A., **Cohen, S. H.**, Jansen, R. A., Odewahn, S. C., Driver, S. P., Kawata, D., Gibson, B. K., & Hopkins, A. 2002, in the Lowell Observatory Workshop on "The Outer Edges of Dwarf Irregular Galaxies", Eds. S. Oey & D. Hunter (astro-ph/0212246 and E-published in http://www.lowell.edu/Workshops/Lowell02/posters.html)

(22) "Study of the Effects from an Oval JWST PSF on the Recoverability of the Structural Parameters of Faint Galaxies"
Jansen, R. A., Windhorst, R. A., & **Cohen, S. H.** 2003, Internal Technical Report to the JWST Project, (GSFC: www.jwst.nasa.gov)

(23) "The B-Band Galaxy Counts as a Function of Morphological Type"
Cohen, S. H. 2003, Ph.D. Thesis, Arizona State University

Research and Technical Experience

My dissertation research has focused on using data from various sources to measure, morphologically classify, and count galaxies. The major end product is the B-band galaxy counts for the range $B = 16 - 27$ mag separated by E/S0, Sabc and Sd-Irr types. From these counts, we have been able to constrain various models of the galaxy counts which are based on luminosity functions (LFs) from local ($z \lesssim 0.1$) redshift surveys. The major goal of this work was to explain the Faint Blue Galaxy excess by further understanding the brighter end of the counts ($B \lesssim 23$ mag) as a function of type.

For the first part, I co-wrote (along with S. Pascarelle) an IDL routine to stack WFPC2 images in a lower S/N regime and better CR rejection when less than four images are combined. This routine was used to stack 30 WFPC2 fields in B(F450W) and I(F814W), which we called the B-band Parallel Survey, from which I constructed catalogs and processed all the galaxies through our artificial neural network classifier. This work complemented the deeper HST studies by extending the B-band galaxy counts as a function of type from $B = 23 - 27$ mag to $B = 19 - 27$ mag. The clearest results are that the models that predict the late-type counts are most discrepant from the models over this full-range and this hinted that luminosity evolution alone cannot reconcile the models and the data.

As a follow-up to this HST survey, B-band imaging data was gathered from several publicly available ground-based surveys to further explore the LF normalization issue as a function of morphological type. Three surveys were found with appropriate data which was B-band imaging of large areas of sky with good seeing. The most applicable data (for the purpose at hand) comes from the 30 sq. deg. Millenium Galaxy Catalog of Liske et al. (2003, MNRAS, 344, 307). This was combined with the optical imaging B-band data from the initial data releases of the NOAO Deep Wide Field Survey and the Deep Lens Survey. Both of these are NOAO Survey Programs with publicly available data. The combinations of these differing data sets has allowed us to anchor the B-band galaxy counts *as a function of type* at $B = 16 - 18$ mag. This data showed that indeed the adopted local LF was able to match the observed galaxy counts as a function of type for $B \lesssim 18$ mag, and hence that there was no need to renormalize the models, *i.e.*, that no adjustments needed to be made to reconcile the newer CCD imaging surveys with the published redshift survey results for $B \lesssim 18$ mag. With the normalization no longer a free parameter, more substantial conclusions can be drawn about the mismatch of the models and the faint (*i.e.*, HDF-like) counts in terms of galaxy evolution.

One of the important lessons I learned from my work was about the utility of publicly available and archived data. I was able to use some of the data for purposes beyond the original intent, and I also became appreciative of what it takes to get the data in the public domain and *in useful form*. In this regard, some surveys are much more useful than others.

As can be seen in the publications list, I have also been involved in various other projects outside of my dissertation. These involved medium-band Lyman-α searches, high redshift ($z \simeq 6$) drop-out searches and other issues relating to galaxy morphology. I was also involved in a project (which has been turned over to another ASU student) where my duties were to download and stack about 900 WFPC2 images from the HST Archive for the purpose of finding the optical IDs and nature FIRST radio sources.

I have image processing experience using both IRAF and IDL. The best example is the IDL WFPC2 image stacker, which co-wrote and ran successfully on over 1000 images. I have also programmed in both IDL and Fortran. As an example, my code to compute model galaxy counts was written in Fortran, but some of the input data is computed from IDL code. For some of the public data I used in my dissertation, I had to run the detection and analysis code *(SExtractor + LMORPHO)* on large images, which usually involved measuring 50-100 thousand objects per frame and reviewing and correcting any errors that may have occured in the automated steps. I've been involved in the process of writing many HST proposals at ASU (including one that I took the lead on), along with various NSF proposals and observing proposals to NOAO and Steward Observatory.

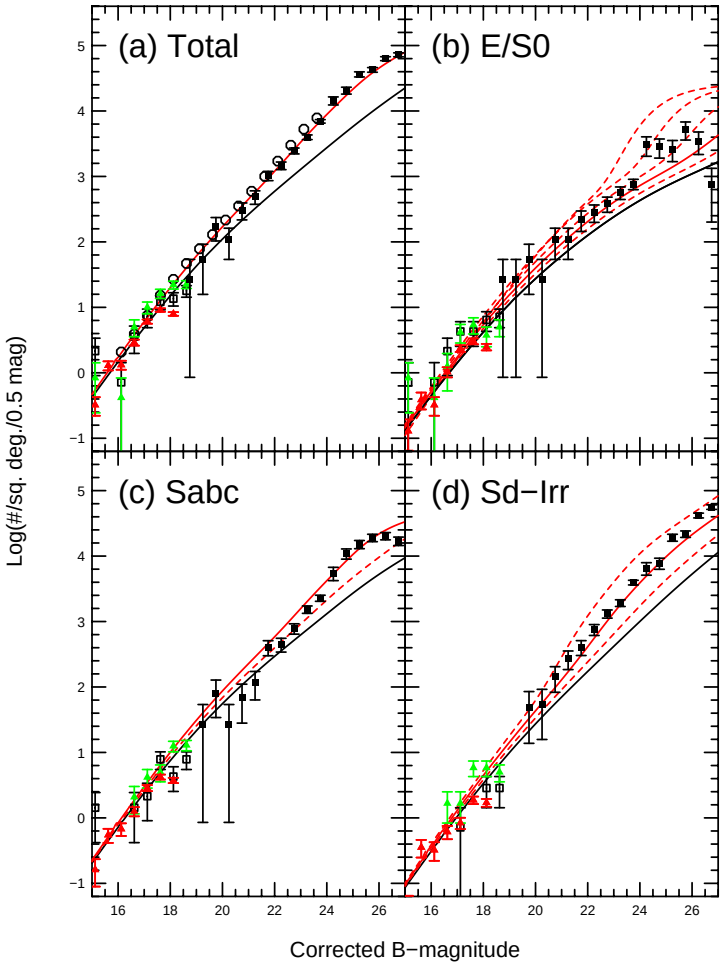

Figure 1: The combined galaxy counts as a function of morphological type and B-band magnitude with all the HST/WFPC2 surveys combined (BBPS, HDF-N, HDF-S, 53W002) as filled black squares. Error bars for these points represent the 2.5σ field-to-field variance. The counts at the bright end are from the three public surveys from which I processed the data. The curves are models based on local LFs using the published (local) normalizations. The models assume luminosity evolution of the form $L^*(z) = L^*(z=0) \times (1+z)^\beta$. The black line is assuming no luminosity evolution (β=0). The excellent match of the $B \lesssim 18$ mag data to the models indicates that the local LF normalization is consistent with this data. With the models anchored at the bright end, the faintest counts suggest about the same amount of evolution for all types ($\beta = 2$; solid red lines) if the excess is interpreted as luminosity evolution, with the Sd/Irr class perhaps requiring slightly stronger evolution than the earlier types. An alternative explanation is a significant increase in the numbers of all types of galaxies for $z \gtrsim 0.4$ or $B \gtrsim 23$ mag due to the epoch dependent merger rate.