

# Sanchayeeta Borthakur

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RESEARCH INTERESTS	Distribution and evolution of cold gas (HI) in Compact Groups. 21cm absorption studies of extragalactic systems to study neutral gas in halos of galaxies and in the intra-group medium. Origin and characteristics of Lyman $\alpha$ absorbers and their connection to galaxies, groups of galaxies and the HI distribution in their vicinity.	
EDUCATION	<b>University of Massachusetts, Amherst, MA USA</b> Ph.D. Candidate, Astronomy, March 2007 (expected graduation date: August 2010) <ul style="list-style-type: none"><li>• Advisors: Todd M. Tripp and Min S. Yun, UMass, Amherst</li></ul> <b>University of Massachusetts, Amherst, MA USA</b> M.S., Astronomy, May, 2007 <b>St. Stephens College, University of Delhi, India</b> B.Sc., Physics, May, 2003	
HONORS AND AWARDS	Green Bank Telescope Student Support Fellowship 2009 (GSSP09-0009) Green Bank Telescope Student Support Fellowship 2008 (GSSP08-0024) Green Bank Telescope Student Support Fellowship 2006 (GSSP06-0002) Selected for the First Round of Chambliss Medals based on my poster “GBT Observations of Hickson Compact Groups - Presence of a Diffuse Neutral Intragroup Medium” in AAS Calgary Meeting, June 2006.	
ACADEMIC EXPERIENCE	<b>University of Massachusetts, Amherst, Massachusetts USA</b> September, 2004 - present  <i>Graduate Student</i> Includes current Ph.D. research, Ph.D. and Masters level coursework and research projects.  <i>Instructor - Teaching Associate at UMass, Amherst</i> Taught an undergraduate course for non-astronomy majors in Observational Astronomy (AST 103) for 4 semesters. Had full responsibility for course structuring, lectures, exams, projects, homework assignments, and final grades.  <i>Graduate Research Assistant at UMass, Amherst</i> <ul style="list-style-type: none"><li>• Observed, reduced and analyzed <b>GBT</b> 21cm observations of Hickson Compact Groups.</li><li>• Reduced and analyzed <b>VLA</b> 21cm observations of Hickson Compact Groups.</li><li>• Analyzed <b>STIS</b> data on 7 low redshift QSOs and estimated <i>cross-correlation</i> function to study the origin of low column density Lyman-alpha absorbers</li></ul>	

- Carried out 21cm **GBT** absorption study and detected likely candidate for damped Lyman-alpha absorber. This will be extended to UV absorption studies using Cosmic Origin Spectrograph on the Hubble Space Telescope.
- Carried out **VLBA** mapping of background quasars to detected 21cm absorption

OBSERVATION &  
DATA REDUCTION  
EXPERIENCE

Green Bank Telescope (**GBT**) - HI (21 cm) emission, absorption, and emission grid mapping.

Very Large Array (**VLA**) - Mapping continuum emission as well as HI line emission in interacting systems. Mapping HI absorption in the spectra of radio bright (extended) background QSO.

Very Long Baseline Array (**VLBA**) - Mapping continuum emission as well as HI line absorption in the spectra of bright radio QSOs.

Space Telescope Imaging Spectrograph (**STIS**)- Measurements of intervening absorption line systems in UV part of the QSO spectra.

Giant Metrewave Radio Telescope (**GMRT**) - Mapping continuum emission at 610 and 1280 MHz of the double-double radio galaxy WN B0925+4200.

National Astronomy and Ionosphere Center (**Arecibo** Observatory) - Analyzing 430 and 1414 MHz data on Pulsars.

PROFESSIONAL  
EXPERIENCE

**National Radio Astronomy Observatory**

Tenth Summer Synthesis Imaging Workshop, June 2006, University of New Mexico, Albuquerque, NM, USA

**National Centre for Radio Astrophysics, TIFR, India**

School on Radio Interferometry and Aperture Synthesis, June 2003, Pune , India

REFERRED AND  
SUBMITTED  
PUBLICATIONS

Borthakur, S., Yun, M. S., & Verdes-Montenegro, L., “Detection of Diffuse Neutral Intra-group Medium in Hickson Compact Groups”, 2009, ApJ, submitted.

Rasmussen, J., Ponman, T. J., Verdes-Montenegro, L., Yun, M. S., & Borthakur, S. “Galaxy Evolution in Hickson Compact Groups: The Role of Ram Pressure Stripping and Strangulation”, 2008, MNRAS, 388, 1245.

Verdes-Montenegro, L., Yun, M. S., Borthakur, S., Rasmussen, J., & Ponman, T. “Cold and hot gas in the most HI deficient compact groups”, 2007, NewAR, 51, 87V.

PAPERS IN  
PREPARATION

Borthakur, S., Tripp, T. M., Yun, M. S., Momjian, E., Bowen, D., York, D. G., & Meiring, J. D. “Using 21cm HI Absorbers in Small Impact Parameter Galaxy-QSO Pairs to Detect Low Redshift Damped Ly $\alpha$  Candidates” - To be soon submitted to ApJ

Borthakur, S., & Tripp, T. M. “Nature and Origin of QSO Absorption Lines - A Study Using High Resolution STIS Spectra combined with SDSS Galaxy Catalogs” - To be submitted to ApJ

Borthakur, S., Yun, M. S., & Verdes-Montenegro, L. “Understanding Evolution in Hickson Compact Groups Using HI morphology” - To be submitted to ApJ

CONFERENCE  
PUBLICATIONS

Borthakur, S., Yun, M. S., & Verdes-Montenegro L. “Detection and Nature of Cold Intra-group Gas in Compact Group Environments”, 2008, in The Evolution of Galaxies through

the Neutral Hydrogen Window' at Arecibo Observatory, Puerto Rico, AIPC, 1035, 201B

Rasmussen, J., Ponman, T. J., Verdes-Montenegro, L., Yun, M. S., & Borthakur, S. "The evolution of galaxy disks in dense environments - Lessons from compact groups", 2009, IAUS, 254P, 56R

Verdes-Montenegro, L., Rasmussen, J., Ponman, T., Yun, M. S., & Borthakur, S. "Intra-group Gas in Differently Evolved Compact Groups of Galaxies", 2007, IAUS, 235, 221V.

Verdes-Montenegro, L. et al., "ISM of Galaxies in Extremely Different Environments: Isolated vs Compact Groups", 2007, ggnu.conf, 349V.

POSTER  
PRESENTATIONS

Borthakur, S., Yun, M. S., & Verdes-Montenegro, L. "GBT Observations of Hickson Compact Groups - Presence of a Diffuse Neutral Intragroup Medium", 2006, AAS, 208.1502B.

Rasmussen, J., Ponman, T., Verdes-Montenegro, L., Yun, M., & Borthakur, S. "The Diverse X-ray Properties Of Compact Galaxy Groups: Implications For Galaxy Evolution", 2008, HEAD, 10.2905R.

Yun, M. S., Borthakur, S., Verdes-Montenegro, L., Ponman, T., & Rasmussen, J. "Galaxy Evolution in Groups: A Chandra and VLA Study", 2007, AAS , 210.3201Y.

Yun, M. S., Xu, C. K., Verdes-Montenegro, L., & Borthakur, S. "High Resolution (6'') Imaging Study of HI in Stefan's Quintet - An Evolutionary History from Gas and Young Stars", 2005, AAS, 20713401Y.

PRESS RELEASE

UMass Press Release describing our discovery of a significantly massive diffuse neutral intragroup medium in Hickson Compact Groups, June 10, 2006, AAS Calgary. Titled : "Astronomers say star fuel may be caught in cosmic web"

INVITED TALKS

Study of Cool Gas in and around Galaxies at Different Size-scales - Columbia University, October, 2009

Understanding the Properties and Distribution of Cold Gas in the Halos of Galaxies and Galaxy-groups - AOC NRAO, Socorro, NM, July, 2008

Connection between galaxies and Ly $\alpha$  absorbers - 4th UC Irvine Center for Cosmology Workshop, April 2008

Cold gas in and around galaxies and galaxy groups - Green Bank Telescope, WV, March 2008

Galaxy interactions with special reference to Hickson Compact Groups - Green Bank Telescope, WV, Oct 2005

Mode Changing in Pulsars PSR 0611+22 and PSR 2303+30 - Indian Space Research Organization, Bangalore, India, Feb 2003

DEPARTMENTAL  
RESEARCH TALKS

Mining the Sloan Digital Sky Survey to Probe the Connections between QSO Absorbers and Galaxies/Environment - UMass, Spring 2007

Do Compact Groups Have a Diffused Neutral Intragroup Medium? - VLA & GBT study of Hickson Compact Groups in 21cm HI emission - UMass, Spring 2006

Hickson Compact Group 90: A Merging System - UMass, Spring 2005

Microquasars: A New Dimension in Understanding Quasars - St. Stephen's College, University of Delhi, Spring 2004

#### PROPOSALS

**PI:** High-resolution Imaging to Unveil the nature & origin of HI in HCGs

*Observed under VLA Legacy ID AB1221*

**PI:** Diffuse Intragroup Medium: Evolution & Connection to Large Scale Structures

*Observed under GBT Legacy ID GB40*

**PI:** 21cm Absorption Spectroscopy of Disk/Halo Gas in Nearby Galaxies: VLA Follow-up

*Observed under VLA Legacy ID AB1305*

**PI:** 21cm Absorption Spectroscopy of Disk/Halo Gas in Nearby Galaxies: VLBA Follow-up

*Observed under VLBA Legacy ID BB263*

**PI:** Probing the fundamental size of HI clouds in the External Galaxies at Parsec Scales

*Observed under VLBA Legacy ID BB271*

**PI:** Completing the GBT Survey of HI Clouds in External Galaxies at Parsec Scales

*Observed under GBT Legacy ID GB90*

**Co-I:** Completing the GBT Survey of Cold Diffuse Intragroup Medium in HCGs

*Observed under GBT Legacy ID GY3*

**Co-I:** What Happens to the Stripped HI in Compact Groups?

*Observed under GBT Legacy ID GY4*

**Co-I:** Probing Distribution and Physical Characteristics of HI Clouds in Galaxy Halos

*Observed under GBT Legacy ID GY12 and VLBA Legacy ID BY124*

**Co-I:** Tracing Large Scale Shocks in Three Hickson Compact Groups

*Observed under VLA Legacy ID AY171*

**Co-I:** Intragroup HI in two galaxy groups associated with a QSO absorption line system

*Observed under VLA Legacy ID AY187*

**Co-I:** Extended HI disk of UGC 7408, a Galaxy-QSO Pair

*Observed under VLA Legacy ID AY190*

#### COMPUTER SKILLS

- Astronomy Packages: AIPS, Karma, GBTIDL, SuperMongo, and DS9.
- Languages: IDL, C, C++, Fortran, Pascal, some use of Unix shell scripts, HTML, and SQL.
- Applications:  $\LaTeX$ , spreadsheet, presentation software, and Mathematica.
- Operating Systems: Linux, Mac OS X, and Windows.