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- Academic Positions** RESEARCH ASSISTANT PROFESSOR Aug 2010 – present  
Dept. of Physics & Astronomy,  
Vanderbilt University.
- RESEARCH ASSOCIATE Dec 2008 – Jul 2010  
Dept. of Physics & Astronomy,  
Vanderbilt University.
- Education** THE PENNSYLVANIA STATE UNIVERSITY, UNIVERSITY PARK, PA Dec 2008  
Ph. D. in Astronomy & Astrophysics  
Thesis: *Hot Halo Gas in Numerical Simulations of Galaxy Mergers*  
Advisor: Kelly Holley-Bockelmann
- INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR, INDIA Jun 2000  
B. Tech. in Electrical Engineering  
Thesis: *A Comparative Study of Theories of Gravitation*  
Advisor: Soumitro Banerjee
- Research Interests**
- GALAXY FORMATION AND EVOLUTION, MERGER HISTORY OF HALOS
  - BLACK HOLE GROWTH IN GALAXIES, REIONIZATION
  - GALAXY DYNAMICS
- Research Experience** VANDERBILT UNIVERSITY 2008–present
- First identification and characterization of halo-halo flybys*  
*Created anomaly-free mergertrees for studying dark matter halo mergers/evolution*  
*Implemented semi-analytic recipes for black hole growth into mergertrees*
- Co-mentored graduate students: Meagan Lang, Daniel Sissom, Baile Li and Lauren Palladino
  - Co-mentored REU students: E’Lisa Marina Lee, Trevor Tomesh and Joshua Schoenfield
- THE PENNSYLVANIA STATE UNIVERSITY 2002–2008
- Initialized a dark matter halo & gas in equilibrium*  
*Used Extended Press-Schechter to estimate the fraction of halo gas released via mergers*
- Selected Talks**
- Towards an Accurate Relation between Galaxies and their host Dark Matter Halos*  
Contributed Talk, Inst. for the Physics & Mathematics of the Universe, Tokyo, Japan, Cosmology with Small-scale Clustering Workshop, July, 2013
- Towards an Accurate Relation between Galaxies and their host Dark Matter Halos*  
Contributed Talk, University of Chicago, Chicago, Galaxies within the Cosmic Web, June, 2013
- Flybys in the Universe: First Results from Cosmological Simulations*  
Invited Talk, Raman Research Institute, Bangalore, India, December, 2012
- Growing the Lightest Supermassive Black Holes: Beyond the Major Merger Paradigm*  
Xtreme Astrophysics, Georgia Tech, Atlanta, August, 2012

*Growing the Lightest Supermassive Black Holes*

Colloquium, University of Alabama, Huntsville, March, 2012

*Flybys in the Universe: A First Look from Cosmological Simulations*

Contributed Talk, Second Workshop on Numerical and Observational Astrophysics: From the First Structures to the Universe Today, Buenos Aires, Argentina, November, 2011

*The Art of Making Mergetrees*

Contributed Talk, Haloes Going Mad Workshop, Madrid, Spain, June, 2010

*Hot Halo Gas in Numerical Simulations of Galaxy Mergers*

Invited Talk, George Washington University, Washington, DC, January, 2008

*Hot Halo Gas in Numerical Simulations of Galaxy Mergers*

Invited Talk, Harvard University, Boston, MA, June, 2008

**Teaching  
&  
Outreach**

VANDERBILT UNIVERSITY 2012

*Organized and taught a L<sup>A</sup>T<sub>E</sub>X Workshop*

- Developed materials for an informal workshop – “L<sup>A</sup>T<sub>E</sub>X – What Can it Do for You?”. This was a half-day hands-on workshop for graduate students in Physics & Astronomy and Earth & Environment Sciences

VANDERBILT UNIVERSITY 2010

*Co-taught ‘Computational Bootcamp’*

- Developed the core materials and exercises for an intensive 8 day course aimed at incoming graduate students. Co-taught the basics of linux, shell commands and IDL for 3 hours per day.

VANDERBILT UNIVERSITY 2009–2011

*Substitute teacher for ‘Order of Magnitude Astrophysics’ and ‘The Structure and Dynamics of Galaxies’*

THE PENNSYLVANIA STATE UNIVERSITY 2002–2007

Graduate Teaching Assistant

ASTRO 011—Introductory Astronomy Lab, instructor

ASTRO 485—Introduction to High Energy Astrophysics, grader (Instructor: Niel Brandt)

ASTRO 440—Introduction to Astrophysics, grader (Instructor: Richard Wade)

VANDERBILT UNIVERSITY 2010

Presented “*Black Holes of the Supermassive Kind*” to 8th graders at Dyer Observatory

THE PENNSYLVANIA STATE UNIVERSITY 2004–2007

Volunteer for Astrofest, open-house activities

Created AstroNight as part of International Students Orientation

**Research  
Skills**

SIMULATION & ANALYSIS

- Generating accurate initial conditions for cosmological and isolated simulations
- Proficient with using simulation software Gadget-2 (hydro + collisionless)
- Expert in linux computer-cluster environments
- Interested in advanced computational and visualization techniques

COMPUTER LANGUAGES

fluent in C and IDL; familiar with FORTRAN, C++, Java, & Python.

<b>Computing Projects</b>	PI: SIMULATIONS OF AN ENSEMBLE OF MILKY WAY ASSEMBLY HISTORIES <i>TG-AST130037, ~ 3 million cpu-hours</i>	2013
	CO-I: LARGE SUITE OF DARK MATTER SIMULATIONS (LASDAMAS) <i>TG-AST080002N, ~ 1.6 million cpu-hours</i>	2012
<b>Miscella- neous</b>	<ul style="list-style-type: none"><li>• Avid soccer fan</li><li>• Volunteer teacher for GED Math at Nashville International Center for Empowerment</li></ul>	1986–present  2009–2011

- First Author**
- A3 A FIRST LOOK AT GALAXY FLYBY INTERACTIONS: I. CHARACTERIZING THE FREQUENCY OF FLYBYS IN A COSMOLOGICAL CONTEXT  
**Sinha, M.** & Holley-Bockelmann, K. 2012, ApJ, 751, 17
- A2 BALANCING THE BARYON BUDGET: FINDING THE FRACTION OF THE IGM DUE TO GALAXY MERGERS  
**Sinha, M.** & Holley-Bockelmann, K. 2010, MNRAS Letters, 405, 31
- A1 NUMERICAL SIMULATIONS OF HOT HALO GAS IN GALAXY MERGERS  
**Sinha, M.** & Holley-Bockelmann, K. 2009, MNRAS, 397, 190
- N-th Author**
- B7 CAN A SATELLITE GALAXY MERGER EXPLAIN THE ACTIVE PAST OF THE GALACTIC CENTER?  
 Lang, M., Holley-Bockelmann, K., Bogdanovic, T., Amaro-Seone, P., Sesana, A. & **Sinha, M.** 2013, 430, 2574
- B6 THE LIVES OF HIGH REDSHIFT MERGERS  
 McCavana, T., Micic, M., Lewis, G. F., **Sinha, M.**, Sharma, S., Holley-Bockelmann, K. & Bland-Hawthorn, J. 2012, MNRAS, 424, 361
- B5 KICKSTARTING REIONIZATION WITH THE FIRST BLACK HOLES: THE EFFECTS OF SECOND-ORDER PERTURBATION THEORY IN PRE-REIONIZATION VOLUMES.  
 Holley-Bockelmann, K., Wise, J. H. & **Sinha, M.** 2012, ApJL, 761, L8
- B4 BENDING OF LIGHT AND GRAVITATIONAL SIGNALS IN CERTAIN ON-BRANE AND BULK GEOMETRIES  
 Kar. S. & **Sinha, M.** 2003, General Relativity & Gravitation, 35, 10
- Papers in prep.**
- C9 BLACK HOLE GROWTH IN ISOLATED GALAXIES  
**Sinha, M.**, Holley-Bockelmann, K. & Micic, M.
- C8 A FIRST LOOK AT GALAXY FLYBY INTERACTIONS: II. DO FLYBYS MATTER?  
**Sinha, M.** & Holley-Bockelmann, K.
- Posters & Proceedings**
- D16 BALANCING THE BARYON BUDGET: THE FRACTION OF THE IGM DUE TO GALAXY MERGERS  
**Sinha, M.** & Holley-Bockelmann, K. 2010, AAS 215, Washington D.C.
- D15 FINDING THE FREQUENCY OF FLYBY ENCOUNTERS IN A COSMOLOGICAL NBODY SIMULATIONS  
 Holley-Bockelmann, K. & **Sinha, M.** 2010, AAS 215, Washington D.C.
- D14 HOT HALO GAS IN GALAXY MERGERS  
**Sinha, M.** & Holley-Bockelmann, K. 2010, *AIP Conference Proceedings, 1240, 171, Hunting For The Dark: The Hidden Side Of Galaxy Formation, Malta, 2009.*
- D13 HOT HALO GAS IN NUMERICAL SIMULATIONS OF GALAXY MERGERS  
**Sinha, M.** & Holley-Bockelmann, K. 2009, AAS 213, Long Beach
- D12 NUMERICAL SIMULATIONS OF HOT HALO GAS IN GALAXY MERGERS  
**Sinha, M.** & Holley-Bockelmann, K. 2009, *ASP Conference Series, 419, 263, Proceedings for Galaxy Evolution: Emerging Insights and Future Challenges, Austin, 2008*
- D11 HOT HALO GAS IN GALAXY MERGERS  
**Sinha, M.** & Holley-Bockelmann, K. 2008, AAS 211, Austin
- D10 HOT HALO GAS IN GALAXY MERGERS  
**Sinha, M.** & Holley-Bockelmann, K. 2007, IAU 244, Cardiff