

Curriculum Vitae - Nitya Kallivayalil

Employment

Aug 25, 2013 – present Assistant Professor, Dept. of Astronomy, **University of Virginia**
 Sept 2010 – Aug 2013 YCAA Prize Fellow, **Yale Center for Astronomy & Astrophysics**
 Sept 2007 – Aug 2010 Pappalardo Fellow, **MIT Department of Physics**

Education

Harvard University — Ph.D. in Astronomy (June 2008)
University of Pennsylvania — M.S. in Physics (2003)
Mount Holyoke College — B.A. in Physics *summa cum laude* (2001)

Honors and Awards

- NSF Career Award (2015).
- YCAA Prize Fellowship, Yale (2010-2013).
- Pappalardo Fellowship, MIT (2007-2010).
- Edward L. Fireman Prize for best Ph.D. thesis, Harvard University (June 2007).
- “*Drifting Clouds*”, Nature Research Highlights (March 2006).
- Sarah Williston Prize, Mount Holyoke College (2001).
- Rusk Prize for Physics, Mount Holyoke College (2000).

Publications (38 total, 27 refereed, 2346 total citations)

Refereed:

(UVa postdocs, graduate and undergraduate students have been underlined)

- 1) ‘The Orbit and Origin of the Ultra-Faint Galaxy Segue 1’, T. Fritz, M. Lokken, N. Kallivayalil, A.R. Wetzel, S.T. Linden, P. Zivick, E.J. Tollerud, submitted to ApJ (arXiv: 1711.09097)
- 2) ‘SMHASH: Anatomy of the Orphan Stream using RR Lyrae stars’, D. Hendel, V. Scowcroft, K.V. Johnston, and the SMHASH team, submitted to MNRAS (arXiv:1711.04663)
- 3) ‘A Widespread, Clumpy Starburst in the Isolated Ongoing Dwarf Galaxy merger dm1647+21’, George Privon, S. Stierwalt, D. Patton, G. Besla, S. Pearson, M. Putman, K. Johnson, N. Kallivayalil, S. Liss, 2017, ApJ, 846, 74
- 4) ‘The Proper Motion of Pyxis: the First Use of Adaptive Optics in Tandem with HST on a Faint Halo Object’, T. Fritz, S. Linden, P. Zivick, N. Kallivayalil, R. Beaton, J. Bovy, L. V. Sales, T. Sohn, D. Angell, M. Boylan-Kolchin, R. Carrasco, G. Damke, R. Davies, S. Majewski, B. Neichel, R. van der Marel, 2017, ApJ, 840, 30

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- 5) 'Identifying true satellites of the Magellanic Clouds', Sales, Laura; Navarro, Julio, Kallivayalil, Nitya; Frenk, Carlos, 2017, MNRAS, 465, 1879
- 6) 'Direct evidence of hierarchical assembly at low masses from isolated dwarf galaxy groups', S. Stierwalt, S.E. Liss, K.E. Johnson, D.R. Patton, G.C. Privon, G. Besla, N. Kallivayalil, M. Putman, 2017, Nature Astronomy, 1, 0025
- 7) 'Hubble Space Telescope Proper Motions of Individual Stars in Stellar Streams: Orphan, Sagittarius, Lethé, and the new "PARALLEL" Stream', Sohn, Sangmo Tony; van der Marel, Roeland P.; Kallivayalil, Nitya; Majewski, Steven R.; Besla Gurtina; Carlin, Jeffrey L.; Law, David R.; Siegel, Michael H.; Anderson, J, 2016, ApJ, 833, 235
- 8) 'The shape of the inner Milky Way halo from observations of the Pal 5 and GD-1 stellar streams', Bovy, Jo; Bahmanyar, Anita; Fritz, Tobias K.; Kallivayalil, Nitya, 2016, 833, 31
- 9) 'Local Volume TiNy Titans: Gaseous Dwarf-Dwarf Interactions in the Local Universe', Pearson, Sarah; Besla, Gurtina; Putman, Mary E.; Lutz, Katharina A.; Fernández, Ximena; Stierwalt, Sabrina; Patton, David R.; Kim, Jinhyub; Kallivayalil, Nitya; Johnson, Kelsey; Sung, Eon-Chang. 2016, MNRAS, 459, 1827
- 10) 'The Proper Motion of Palomar 5', Fritz, T. & Kallivayalil, N. 2015, ApJ, 811, 123
- 11) 'Hubble Space Telescope Proper Motions along the Sagittarius Stream: I. Observations and Results for Stars in Four Fields', Sohn, Sangmo Tony; van der Marel, Roeland P.; Carlin, Jeffrey L.; Majewski, Steven R.; Kallivayalil, Nitya; Law, David R.; Anderson, Jay; Siegel, Michael H. 2015, ApJ, 803, 56
- 12) 'TiNy Titans: The Role of Dwarf-Dwarf Interactions in the Evolution of Low Mass Galaxies', Stierwalt, S.; Besla, G.; Patton, D.; Johnson, K.; Kallivayalil, N.; Putman, M.; Privon, G.; Ross, G. 2015, ApJ, 805, 2
- 13) 'Third-Epoch Magellanic Cloud Proper Motions II: The LMC Rotation Field in Three Dimensions', van der Marel, R.P., & Kallivayalil, N. 2014, ApJ, 781, 121
- 14) 'Third-Epoch Magellanic Cloud Proper Motions I: HST/WFC3 data and Orbit Implications', Nitya Kallivayalil, Roeland van der Marel, Jay Anderson, Gurtina Besla, Charles Alcock, 2013, ApJ, 764, 161
- 15) 'A Cold Milky Way Stellar Stream in the Direction of Triangulum', Ana Bonaca, Marla Geha & Nitya Kallivayalil, 2012, ApJ, 760, L6

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- 16) 'The Role of Dwarf Galaxy Interactions in Shaping the Magellanic System and Implications for Magellanic Irregulars', Gurtina Besla, Nitya Kallivayalil, Lars Hernquist, Roeland van der Marel, T.J. Cox, Dusan Keres, 2012, MNRAS, 421, 2109
- 17) 'Simulations of the Magellanic Stream in a First Infall Scenario', Gurtina Besla, Nitya Kallivayalil, Lars Hernquist, Roeland van der Marel, TJ Cox, Dusan Keres, 2010, ApJL, 721, L97
- 18) 'A Deeper Look at Leo IV: Star Formation History and Extended Structure', David Sand, Anil Seth, Edward Olszewski, Beth Willman, Dennis Zaritsky, Nitya Kallivayalil, 2010, ApJ, 718, 530
- 19) 'The case for a directional dark matter detector and the status of current experimental efforts', Ahlen, S. et al. 2010, International Journal of Modern Physics A, 25, 1
- 20) 'Revisiting the Role of M31 in the Dynamical History of the Magellanic Clouds', Nitya Kallivayalil, Gurtina Besla, Robyn Sanderson & Charles Alcock, 2009, ApJ, 700, 924
- 21) 'The Orbital History of the LMC', Besla, G., Kallivayalil, N., Hernquist, L., et al. 2008, The Orbital History of the LMC (p. 275-276) In: Galaxies in the Local Volume, Koribalski, Bärbel Silvia, Jerjen, H. eds. Springer, Netherlands.
- 22) 'Are the Magellanic Clouds on their First Passage About the Milky Way?', Gurtina Besla, Nitya Kallivayalil, Lars Hernquist, Brant Robertson, TJ Cox, Roeland P. van der Marel, Charles Alcock, 2007, ApJ, 668, 949
- 23) 'Identification of the Microlens in Event MACHO-LMC-20', Nitya Kallivayalil, Brian M. Patten, Massimo Marengo, Charles Alcock, Michael W. Werner, Giovanni G. Fazio, 2006, ApJL, 652, L97
- 24) 'Is the SMC Bound to the LMC? The HST Proper Motion of the SMC', Nitya Kallivayalil, Roeland P. van der Marel, Charles Alcock, 2006, ApJ, 652, 1213
- 25) 'The Proper Motion of the Large Magellanic Cloud using HST', Nitya Kallivayalil, Roeland P. van der Marel, Charles Alcock, Tim Axelrod, Kem H. Cook, A.J. Drake, M. Geha, 2006, ApJ, 638, 772
- 26) 'Spitzer Space Telescope Observations of the Aftermath of Microlensing Event MACHO-LMC-5' Hien Trong Nguyen, Nitya Kallivayalil, Michael Werner, Charles Alcock, Brian M. Patten, Daniel Stern, 2004, ApJS, 154, 266

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- 27) 'On the Effect of Electron Collisions in the Excitation of Cometary HCN', Amy J. Lovell, Nitya Kallivayalil, F. Peter Schloerb, Michael R. Combi, Kenneth C. Hansen, T. I. Gombosi, 2004, *ApJ*, 613, 615

Conference Proceedings/White Papers:

- 28) 'Astrometry with MCAO at Gemini and at ELTs', Tobias K. Fritz, Nitya Kallivayalil, Eleazar R. Carrasco, Benoit Neichel, Richard Davies, Rachael Beaton, Dylan Angell, Sean Linden, Paul Zivick, Steve Majewski, Guillermo Damke, Mike Boylan-Kolchin, Roeland van der Marel, Tony Sohn, 2016, Proceedings of the Fourth AO4ELT Conference, arXiv: 1601.00965
- 29) 'A Hubble Astrometry Initiative: Laying the Foundation for the Next-Generation Proper-Motion Survey of the Local Group', Kallivayalil, Nitya,; Wetzel, Andrew R.; Simon, Joshua D.; Boylan-Kolchin, Michael; Deason, Alis J.; Fritz, Tobias K.; Geha, Marla; Sohn, Sangmo Tony; Weisz, Daniel R. 2015, White Paper submitted to STScI for Hubble's 2020 Vision, arXiv:1503.01785
- 30) 'Enabling a Diverse Community to Produce Cutting-Edge Science with LSST', Willman, B., et al. 2014, White Paper submitted by the 20 LSST Science Collaboration Chairs to the NRC's Committee on a Strategy to Optimize the US OIR System in the Era of LSST
- 31) 'Local Group and Star Cluster Dynamics from HSTPROMO (The Hubble Space Telescope Proper Motion Collaboration)', van der Marel et al. 2013. "Structure and Dynamics of Disk Galaxies", M. S. Seigar and P. Treuhardt, eds., ASP Conference Series (arXiv:1309.2014) (4pp.).
- 32) 'The implications of a first infall scenario on the star formation histories and kinematics of the Magellanic Clouds', Gurtina Besla, Lars Hernquist, Nitya Kallivayalil, Roland van der Marel, TJ Cox, Dusan Keres, 2011, Galaxy Formation: An Intl. Conference, <http://astro.dur.ac.uk/Gal2011,id.35>
- 33) 'Dynamics of the LMC', Nitya Kallivayalil, 2010, Dynamics from the Galactic Center to the Milky Way Halo, Cambridge, MA, <http://www.cfa.harvard.edu/events/2010/dyn>, p.35
- 34) 'New Analysis of the Proper Motions of the Magellanic Clouds using HST/WFPC2', Nitya Kallivayalil, Roeland P. van der Marel, Jay Anderson, Gurtina Besla & Charles Alcock, 2009, IAU Symposium 256, 93, The Magellanic System: Stars, Gas, and Galaxies, J.Th. van Loon & J.M. Oliveira, eds. (Cambridge: Cambridge University Press)
- 35) 'The Binariness of the Magellanic Clouds and the Formation of the Magellanic Stream', Gurtina Besla, Nitya Kallivayalil & Roeland P. van der Marel, 2009, IAU Symposium 256, 99

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- 36) ‘Kinematical Structure of the Magellanic System’, Roeland P. van der Marel, Nitya Kallivayalil & Gurtina Besla, 2009, IAU Symposium 256, 81
- 37) ‘LSST: from Science Drivers to Reference Design and Anticipated Data Products’, Ivezić, Z et al. 2008, LSST overview paper (living document), arXiv:0805.2366
- 38) ‘Spitzer/IRAC Observations of the Fields of Five LMC Microlensing Events’, Nitya Kallivayalil, Brian M. Patten, Michael W. Werner, Charles Alcock, Hien T. Nguyen, 2006, ASPC, 357, 70

Teaching & Service

Total number of UVa personnel advised to date: 1 Postdoctoral Associate, 3 Graduate Students, 5 Undergraduates, 8 Graduate Research committees & 22 non-major undergraduate advisees.

Astr 8500 ‘Astronomical Topics’
 Astr 3130, ‘Observational Astronomy’
 Astr 1610, ‘Introduction to Astronomy Research’
 Astr 1220, ‘Stars, Galaxies and the Universe’
 Astr 4140, ‘Research Methods in Astrophysics’

Advising:

Graduate Advisor: Paul Zivick, Dylan Angell, Sean Linden (co-advising)
 Postdoctoral Advisor: Tobias Fritz
 Undergraduate Thesis Advisor: Lucas Beane, Alex Bixel
 Undergraduate Research Advisor: Joy Skipper, Melanie Grierson, Martine Lokken
 Graduate Research Committee: Zivick, Hayes, Beale, Lewis
 Graduate Thesis Committee: Linden, Wenger, Bittle, Liss, Lee, Damke

National/International Service

- **Scientific Chair:** Stars, Milky Way & Local Volume LSST Science Collaboration (2013 - present)
- NOAO Time Allocation Committee (TAC; 2013 - present)
- Hubble Space Telescope TAC
- Referee for Nature, ApJ, ApJL, AJ, A&A, PASP, MNRAS
- Reviewer for NSF

Research Grants

Only Current and Pending amounts to UVa listed. Full Amount is shown for the HST Treasury program. Previous totals include \$189,060 as PI and \$1,266,515 as Co-I.

Current:

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- **Co-I** JWST Prop. ID 1334 (Cycle 0, \$TBD): “*The Resolved Stellar Populations Early Release Science Program*” (2019)
- **PI** STScI HST-GO-14734 (Treasury Program; \$725,754): “*Milky Way Cosmology: Laying the Foundation for Full 6-D Dynamical Mapping of the Nearby Universe*” (9/1/16 – 11/30/19)
- **PI** STScI HST-GO-14343 (\$80,995): “*Proper Motion and Internal Kinematics of the SMC: are the Magellanic Clouds bound to one another?*” 2nd epoch (9/1/16 – 9/30/19)
- **PI** NSF/AST (\$754,824): “*CAREER: The Dynamics of Local Group Substructure as the Key to Understanding Dark Matter and Galaxy Formation*” (8/1/15 – 7/31/20)
- **PI** STScI HST-GO-13476 (\$86,312): “*Proper Motion and Internal Kinematics of the SMC: are the Magellanic Clouds bound to one another?*” 1st epoch (10/1/13 – 9/30/19)
- **Co-I** STScI HST-GO-13443 (\$7,771): “*Proper Motions of the Orphan Stream: Finding the Parent, Orbit and Milky Way Halo Shape*” (10/1/13 – 9/30/16)
- **Co-I** STScI HST-GO-13834 (\$13,956): “*The Proper Motion Field Along the Magellanic Bridge: A New Probe of the LMC-SMC Interaction*” (11/1/14 – 10/30/17)

Competitively Obtained Observing Time

Highlights: 236 orbits on Hubble Space Telescope, 1425 hours on Spitzer Space Telescope, 143.3 hours on Gemini, 28 hours on Large Binocular Telescope, 27 nights on 6.5 and 4-m telescopes.

Selection of most recent:

- **Co-I**; JWST Cycle 0 Early Release Science Program: 27.2 hours (2019)
- **PI**; HST Treasury Program/Cycle 24: 164 orbits with ACS and WFC3 (2016)
- **Co-I (PI: T. Fritz)**: 143.3 hrs; Large and Long Gemini Multi-Conjugate Adaptive Optics Program (LP-2014B-032): “*Probing the Dark Halo of the Milky Way with GeMS/GSAOI*” (through 2017).
- **Co-I**; HST/Cycle 23: 14 orbits with WFC3 and ACS (2016)
- **PI**; HST/Cycle 23: 30 orbits with WFC3 and ACS (2016)
- **Co-I**: 3 nights on CT-4m/DECam: “*An Abridged Tail: Mapping the Palomar 5 Tidal Stream with DECam*” (May 2014)

Scientific Talks

53 scientific talks in the past 10 years; selection of most recent:

Invited Conferences & Programs

- **Co-organizer**: “*Dynamics of the Milky Way System in the Era of Gaia*”, Aspen Center for Physics Summer Workshop, 2018.
- “*Shedding Light on the Dark Universe with Extremely Large Telescopes*”, UCLA, April 2018.
- “*The Galaxy-Halo Connection Across Cosmic Time*”, Kavli Institute for Theoretical Physics Program, Santa Barbara, May - July 2017.
- “*(re)Solving Galaxies in the Era of Extremely Large Telescopes*”, organized by the GMTO, Monterey, CA, October 2015.

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- National Academy of Sciences, Kavli Frontiers of Science Symposium, June 16-18, 2015, Jeju, South Korea (declined).
- “HST Astrometry”, invited talk at the IAU Div.A, Hawaii, August, 2015 (declined).
- “*Milky Way Halo Kinematics*”, Hubble 2020: Building on 25 Years of Discovery Conference, Baltimore, MD, April 2015 (**Review**).
- “*Stellar Streams in the Local Universe*”, Ringberg Castle, Germany, July 2015.
- “*Galactic Archaeology and Precision Stellar Astrophysics*”, Kavli Institute for Theoretical Physics Program, March 2015.
- “*Dwarf Galaxies as Cosmological Probes*”, Aspen Center for Physics Program, May-June, 2014.
- “*Streams and Halo Substructure*”, APOGEE-2 General Meeting, UNAM, Mexico City, March 2014 (**Review**)
- “*Proper Motions of the Clouds and their Past Orbits*”, Workshop on the Magellanic Clouds, ICRAR, Perth, Australia, Sept 10-13, 2012 (**Review**)

Selection of recent invited Prize Colloquia & Colloquia:

- UT Austin, Oct 2017
- INAF, Monte Porzio, Rome, July 2017
- Stanford, April 2017
- UC Berkeley, Feb 2017
- University of Delaware, Oct 2016
- UCLA, May 2016
- Texas A&M, Feb 2016
- Herzberg Institute for Astrophysics, Victoria, BC, Feb 2016
- **Kamper Lecture**, Dunlap Institute, University of Toronto, ON, Dec 2015 (Prize Colloquium)

Outreach (selection of 5 most recent)

- PI of UVa-Spelman Collaboration and REU Program (2015 - 2020)
- ‘*Central Virginia Star Party*’, Dark Skies, Bright Kids Outreach Program (2014)
- WTJU Radio Interview, “Soundboard” program (2014)
- Public Nights at McCormick Observatory, UVa (2013 - present)
- Invited Panelist: ‘*Saving Hubble*’ Public Screening and Discussion, Haverford College (2012)

Media Coverage

- ‘*Gemini Tracks Distant Star Cluster with Adaptive Optics*’, Gemini Press Release, May 2017
- ‘*Minority Students Rave About Science Research*’, UVa Today, August, 2016
- ‘*Nitya Kallivayalil: The Biographer of Galaxies*’, Open Magazine, May 2015
- ‘*Keralite scientist wins research aid from US National Science Foundation*’, Malayala Manorama Daily, India, April, 2015
- ‘*Utpal Chatterjee and Nitya Kallivayalil Earn Coveted NSF Early Career Development Awards*’, UVa News, April 2015

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- *'UVA's Nitya Kallivayalil and colleague have a 3D view of stars in another galaxy'*, examiner.com, Feb 2014
- *'Star Performers: The Magellanic Clouds'*, Scientific American, April 2013
- *'Milky Way consumes stars, galaxies'*, Yale Daily News, November 2012
- *'Hors d'Oeuvre for the Milky Way'*, Time Magazine, October 2012
- *'The Great Galactic Travelers'*, Sky & Telescope, October 2012
- *'The New Cosmic Neighborhood'*, Discover Magazine, September 2007
- *'Dwarf Galaxies Caught Speeding'*, Smithsonian Magazine, March 2007
- *'Magellanic Clouds 'just passing''*, BBC News, 2007
- *'Speed of Milky Way's companions poses puzzle'*, Science News, 2007
- *'Speedy Discovery Fuels New Milky Way Mystery'*, Space.com, USA Today, 2007
- *'Milky Way clouds are speeding through space'*, MSNBC.com, 2007
- *'Speeding dwarfs upset galactic family picture'*, NewScientist, 2007
- *'Getting to know the galactic neighbors. Astronomers make startling discoveries in our own backyard'*, news@nature.com, 2007
- *'Drifting Clouds'*, Nature Research Highlights, March 2 2006
- *'Women astronomers detail struggles, triumphs'*, Harvard University Gazette, 2005
- *'Women astronomers reflect on rewards, challenges of careers'*, the Torch, 2005