

# Kenza Sigrid Arraki

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## ASTROPHYSICAL RESEARCH NUMERICAL SIMULATION • COMPUTATIONAL ANALYSIS

Qualifications include:

*Extragalactic astronomy:* galaxy formation and evolution, Milky Way-type galaxies, dwarf galaxies, satellite galaxy abundance and evolution, importance of stellar feedback and baryonic processes: radiation pressure and supernovae feedback, morphological transformation of dwarf galaxies

*Numerical techniques:* N-body simulations, hydrodynamical simulations, cosmological zoom-in simulations, Adaptive Refinement Tree (ART) code, data analysis and visualization, parallelization

### EDUCATION

*Candidate*

**New Mexico State University** Las Cruces, NM

- Doctor of Philosophy (Ph.D.) in ASTRONOMY

Dissertation: galaxy formation and evolution - Advisor: Dr. Anatoly Klypin

2013

**New Mexico State University** Las Cruces, NM

- Masters of Science (M.S.) in ASTRONOMY

2010

**University of Washington** Seattle, WA

- Bachelor of Science (B.S.) in PHYSICS
- Bachelor of Science (B.S.) in ASTRONOMY
- Minor in MATHEMATICS

### RESEARCH EXPERTISE

2013 – Present

Investigating low-mass galaxy evolution

Dr. Anatoly Klypin, New Mexico State University

- Studying the evolution of 50 isolated dwarf galaxies
- Cosmological hydrodynamical simulation suite using the *hydroART* code
- Includes many important physical processes such as stellar winds, advection, supernovae feedback, radiation pressure, and photoionization pressure

2012 – 2014

Death of a dwarf: Predicting the tidal stripping of satellite galaxies

Dr. Anatoly Klypin, New Mexico State University

- Predicting structural properties of tidally stripped satellite galaxies
- $10^8$  and  $10^9 M_{\odot}$  satellites on eight elliptical orbits around Milky Way hosts

2012 – 2014

Effects of baryon removal on the structure of dwarf spheroidal galaxies

Dr. Anatoly Klypin, New Mexico State University

- [Arraki et al. 2014, MNRAS, 438, 1466](#)

- The inclusion of baryonic effects alleviate a small-scale concern for LCDM, the too-big-to-fail problem. After including baryons, once massive simulated satellite galaxies come into agreement with the observed local group dwarf spheroidals.
- Baryons were included by incorporating a low baryon fraction in dwarf spheroidal galaxies (dSphs) and a concentration of baryons in the Milky Way.

- 2008 – 2014      Variability in Broad Absorption Line (BAL) Quasars  
Dr. Daryl Haggard, Northwestern University
- 2010 – 2011      Absorbing properties of galaxies near quasars  
Dr. Churchill, New Mexico State University
- 2009 – 2010      Inclination trends in young stellar objects  
Dr. Carol Grady, NASA Goddard Space Flight Center
- 2006 – 2009      Asteroids in Sloan Digital Sky Survey and trans-Neptunian objects in ESSENCE  
Dr. Andrew Becker, University of Washington

## **AWARDS**

- **Blue Waters Graduate Fellowship Program**  
National Science Foundation and the University of Illinois, 2014.
- **NMSU Graduate School Merit Achievement Enhancement Award**  
New Mexico State University: College of Arts and Sciences, 2014.
- **NSF Graduate STEM Fellows in K-12 Education (NSF GK-12)**,  
New Mexico State University: Department of Computer Science, 2013.
- **The Barry Neil Rappaport Scholarship**,  
New Mexico State University: Department of Astronomy, 2013.
- **NSF Graduate Research Fellowship (NSF GRFP)**,  
National Science Foundation, 2010.
- **NASA Motivating Undergraduates in Science and Technology Scholarship**,  
NASA, 2008.
- **Presidential Research Scholarship**,  
University of Washington: Early Identification Program, 2008.
- **The John Baer Award for Excellence in Academia**,  
University of Washington: Department of Astronomy, 2008.
- **Washington NASA Space Grant Summer Undergraduate Research Program**,  
University of Washington, 2007.

## **SERVICE**

- President, Astronomy Graduate Student Organization,  
New Mexico State University, 2012-2013.
- Organizer, Astronomy Galaxy and Extragalactic Group,  
New Mexico State University, 2012-2013.
- Vice President, Astronomy Graduate Student Organization,  
New Mexico State University, 2011-2012.
- Outreach event coordinator, Department of Astronomy,  
New Mexico State University, 2011-2012.

## **MEMBERSHIP**

- American Astronomical Society
- Project AGORA: High-resolution Galaxy Simulation Comparison Project
- [yt-project member](#)

## PUBLICATIONS

### [ADS publication list](#)

#### *First Author:*

“Effects of baryon removal on the structure of dwarf spheroidal galaxies”

**Arraki, K.**, Klypin, A., More, S., Trujillo-Gomez, S., 2014, MNRAS, 438, 1466  
([arXiv:1212.6651](#))

#### *Other:*

Trujillo-Gomez, S., Klypin, A., Colin, P., Ceverino, D., **Arraki, K.**, Primack, J.,  
2015, MNRAS, 446, 1140 ([arXiv:1311.2910](#))

Haggard, D., **Arraki, K.**, Green, P., Aldcroft, T., Anderson, S. 2012, in Astronomical Society of the Pacific Conference Series, Vol. 460, AGN Winds in Charleston, ed. G. Chartas, F. Hamann, & K. M. Leighly, 98

Hornbeck, J., et al., 2012, ApJ, 744, 54H

Becker, A., **Arraki, K.**, et al. 2008, ApJL, 682, L53

[Media publication](#) of asteroid search, NBC News, October 2007

## CONFERENCE ATTENDANCE

2015 Jun Local Group Astrostatistics, Ann Arbor, MI  
2015 May NCSA Blue Waters Symposium, Sunriver, OR  
2015 Mar New Mexico State Graduate Research and Arts Symposium, Las Cruces, NM  
2015 Jan 225<sup>th</sup> American Astronomical Society Meeting, Seattle, WA  
2014 Nov SC14 Supercomputing Conference, New Orleans, LA  
2014 Oct yt Developers Workshop, Champaign, IL  
2014 Aug Satellite galaxies and dwarfs in the local group, Potsdam, Germany  
2014 Aug 3<sup>rd</sup> AGORA Comparison Project Workshop, Santa Cruz, CA  
2014 Aug UC Santa Cruz Galaxy Workshop, Santa Cruz, CA  
2014 May Second Annual NCSA Blue Waters Symposium, Champaign, IL  
2014 Mar yt Developers Workshop, Santa Cruz, CA  
2014 Mar Computational Astrophysics 2014-2020: Approaching Exascale, Berkeley, CA  
2014 Mar New Mexico State Graduate Research and Arts Symposium, Las Cruces, NM  
2014 Feb UC Irvine Near Field Deep Field Connection, Irvine, CA  
2014 Jan The 29<sup>th</sup> New Mexico Symposium, Socorro, NM  
2014 Jan 223<sup>rd</sup> American Astronomical Society Meeting, Washington, D.C.  
2013 Aug 2<sup>nd</sup> AGORA Comparison Project Workshop, Santa Cruz, CA  
2013 Aug UC Santa Cruz Galaxy Workshop, Santa Cruz, CA  
2013 Jun Galaxies within the Cosmic Web Workshop, Chicago, IL  
2013 Mar New Mexico State Graduate Research and Arts Symposium, Las Cruces, NM  
2013 Feb yt Developers Workshop, Santa Cruz, CA  
2013 Jan Early Galaxy Formation in LCDM Cosmology, Jerusalem, Israel  
2012 Nov The 28<sup>th</sup> New Mexico Symposium, Socorro, NM  
2012 Aug UC Santa Cruz Galaxy Workshop, Santa Cruz, CA  
2012 Mar New Mexico State Graduate Research and Arts Symposium, Las Cruces, NM  
2012 Jan 219<sup>th</sup> American Astronomical Society Meeting, Austin, TX  
2011 Mar New Mexico State Graduate Research and Arts Symposium, Las Cruces, NM  
2011 Jan 217<sup>th</sup> American Astronomical Society Meeting, Seattle, WA  
2010 Jan 215<sup>th</sup> American Astronomical Society Meeting, Washington, D.C.

**PRESENTATIONS**

- 2015 Jun Poster **“Satellite and isolated dwarf galaxies around Milky Way mass halos”**  
Local Group Astrostatistics, Ann Arbor, MI
- 2015 May Talk **“Examining the evolving properties of dwarf galaxies using the hydrodynamical  
Poster adaptive refinement tree (ART) code”**  
NCSA Blue Waters Symposium, Sunriver, OR
- 2015 Mar Poster **“Comparing the properties of satellite and isolated dwarf galaxies”**  
New Mexico State Graduate Research and Arts Symposium, Las Cruces, NM
- 2015 Jan Talk **“Are dwarf galaxies killed by reionization?”**  
225<sup>th</sup> American Astronomical Society Meeting, Seattle, Washington
- 2014 Aug [Talk](#) **“Comparing the evolving Properties of Satellite and Isolated Dwarf Galaxies”**  
Satellite galaxies and dwarfs in the local group, Potsdam, Germany
- 2014 Aug [Talk](#) **“Comparing the evolving Properties of Satellite and Isolated Dwarf Galaxies”**  
UC Santa Cruz Galaxy Workshop, Santa Cruz, CA
- 2014 Mar Talk **“The tidal disruption of satellite galaxies”**  
New Mexico State Graduate Research and Arts Symposium, Las Cruces, NM
- 2014 Feb Poster **“Predicting the evolving properties of low-mass Milky Way satellites”**  
UC Irvine Near Field Deep Field Connection, Irvine, CA
- 2014 Jan [Talk](#) **“Effects of baryon removal on the structure of dwarf spheroidal galaxies”**  
The 29<sup>th</sup> New Mexico Symposium, Socorro, NM
- 2014 Jan [Talk](#) **“Massive No More: How baryon removal and tidal stripping alter the structure  
of dwarf spheroidal galaxies”**  
223<sup>rd</sup> American Astronomical Society Meeting, Washington, D.C.
- 2013 Aug [Talk](#) **“Predicting the tidal stripping of satellite galaxies”**  
UC Santa Cruz Galaxy Workshop, Santa Cruz, CA
- 2013 Jun [Talk](#) **“Effects of baryon removal on the structure of dwarf spheroidal galaxies”**  
Galaxies within the Cosmic Web, Chicago, IL
- 2013 Mar Colloquium **“Creating the Universe: Using simulations to understand astronomy”**  
University of Portland, Portland, OR
- 2013 Mar Talk **“Effects of baryon removal on the structure of dwarf spheroidal galaxies”**  
New Mexico State Graduate Research and Arts Symposium, Las Cruces, NM
- 2013 Jan [Poster](#) **“Effects of baryon removal on the structure of dwarf spheroidal galaxies”**  
30<sup>th</sup> Jerusalem Winter School in Theoretical Physics, Jerusalem, Israel
- 2012 Nov [Talk](#) **“Effects of baryon removal on the structure of dwarf spheroidal galaxies”**  
The 28<sup>th</sup> New Mexico Symposium, Socorro, NM
- 2012 Aug [Talk](#) **“Effects of baryons on the circular velocities of dwarf satellites”**  
UC Santa Cruz Galaxy Workshop, Santa Cruz, CA
- 2012 Jun Talk **“Monitoring multi-epoch outflows from Broad Absorption Line Quasars”**  
Northwestern University, Department of Astronomy, Evanston, IL
- 2012 Mar Poster **“FAST BAL Monitoring Campaign: Multi-epoch constraints on quasars”**  
New Mexico State Graduate Research and Arts Symposium, Las Cruces, NM
- 2012 Jan [Poster](#) **“FAST BAL Monitoring Campaign: Multi-epoch constraints on quasars”**  
219<sup>th</sup> American Astronomical Society Meeting, Austin, TX
- 2011 Mar Poster **“Variable high velocity winds from Broad Absorption Line Quasars”**  
New Mexico State Graduate Research and Arts Symposium, Las Cruces, NM
- 2011 Jan [Poster](#) **“Variable high velocity winds from Broad Absorption Line Quasars”**  
217<sup>th</sup> American Astronomical Society Meeting, Seattle, WA
- 2010 Jan [Poster](#) **“Probing disk stratification by combining X-ray and disk inclination data for  
Taurus-Auriga”**  
215<sup>th</sup> American Astronomical Society Meeting, Washington, D.C.

**OUTREACH**

New Mexico State University Relay for Life, April 2015  
Las Cruces Elementary School Visit to Tombaugh Observatory, April 2015  
Sierra Middle School Science Fair Judge, February 2015  
Solar Eclipse Event, October 2014  
Observe the Moon Night, September 2014  
Create Your Own App: Summer Camp, *Leader*, July 2014  
Lunar Eclipse Event, April 2014  
Monte Vista Elementary Star Party, April 2014  
Southern New Mexico Regional Science Fair Judge, March 2014  
Sierra Middle School Science Fair Judge, February 2014  
Zia Middle School Science Olympiad, *Assistant Coach*, 2013-2014  
Sky Safari Astronomy Night, September 2013  
Sky Safari Astronomy Night, April 2013  
New Mexico State University Relay for Life, *Team Captain*, April 2013  
New Mexico State University Astronomy Open House, February 2013  
White Sands Science Night, January 2013  
Solar Eclipse Public Event, May 2012  
Apollo 16th 40th Anniversary Celebration, March 2012  
Southern New Mexico SEMAA events, November 2011 to February 2012  
New Mexico State University Astronomy Open House, January 2012  
Tombaugh Elementary, November 2011  
International Observe the Moon Night, October 2011  
Vesta Fiesta, August 2011  
New Mexico State University Relay for Life, April 2011  
New Mexico State University Astronomy Open House, March 2011  
New Mexico State University Campus Observatory Events, 2010-2015