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## Avani Gowardhan

### Education

#### Cornell University

PhD Candidate, Department of Astronomy (expected graduation 2019) .

Advisor: Dr. Dominik Riechers .

Master of Science, Astronomy, *July 2016* .

#### Indian Institute of Science Education and Research, Pune

Master of Science (Distinction), Physics, *July 2014* .

Bachelor of Science, Physics, *July 2014* .

### First-Author publications (See here for an up-to-date list.)

- “High Dense Gas Fraction in a Gas-rich Star-forming Galaxy at  $z = 1.2$ ”, The Astrophysical Journal, Volume 838, Issue 2, article id. 136, 15 pp. (2017). [Link](#)
- “The Dual Role of Starbursts and Active Galactic Nuclei in Driving Extreme Molecular Outflows”, The Astrophysical Journal, Volume 859, Issue 1, article id. 35, 23 pp. (2018). [Link](#)
- “Hearts of Darkness : Lessons learned from deeply obscured nuclei in the nearby universe”, *in prep*
- “Molecular gas properties in a  $z \sim 3$  main-sequence galaxy”, *in prep*

### Research

- A bayesian framework for multi-wavelength source detection, *2016* Optimized source detection in a multi-wavelength dataset using Python: the code identifies real astronomical sources given images from different instruments, and with different resolutions and sensitivity.
- A Blind Ka/Q-band Survey for Molecular Absorption at High Redshift (Thesis Project, NCRA), (*2013-2014*) Developed pipeline for blind search of CO and HCO+ spectral line features to quantify the redshift number density of molecular absorbers in  $> 500$  galaxies between  $0.9 < z < 2.5$  using Python, and Mathematica.

- Enhanced Sensitivity in Gravitational Wave Detection from Supernovae, CGWA, UT Brownsville (*May-August, 2012*) Improved search sensitivity for detection of GWs from supernovae by implementing Blind Source Separation (BSS) algorithm using Matlab to enhance search sensitivity for detection of weak gravitational wave signals in LIGO data. Tested with simulated as well as LIGO fourth Science run data (S4).
- Probing variation in fundamental constants using QSO Spectra, NCRA, *Aug - Dec, 2012* Searched for a fractional change in the value of the fine structure constant over cosmological timescales using cross-correlation of SiIV doublet absorption lines in QSO spectra from Keck/HIRES.

## Fellowships and honors

- Visiting Graduate Research Fellowship, IPAC, Caltech, *2018*
- Cranson and Edna B. Shelley Teaching Assistant Award, *2017*
- Cornell University Graduate Fellowship, *2014*
- Council of Scientific & Industrial Research (CSIR), India, Junior Research Fellowship, *2013*
- DAAD-WISE Fellowship, *2012*
- CNR Rao Education Foundation Prize, IISER Pune, *2010*
- KVPY Fellowship, Department of Science and Technology, Government of India, (*2009-2014*)
- Dean's List, IISER Pune, (*2009-2014*)

## Technical Skills

**Programming:** Python (Jupyter, numpy, scipy, astropy, pandas, scikit-learn), Bash, Linux, Matlab, LaTeX, Mathematica

**Selected Coursework:** Machine Learning for Intelligent Systems, Computational Physics, Signal Modeling, Statistical Inference and Data Mining in Astronomy

## Observing Experience

**Atacama Large Millimeter/submillimeter Array (ALMA):** - PI : 'Probing Dense Gas Physics in the Most Extreme Southern Molecular Outflow', 8.2 hours

- PI : 'The galaxy-wide impact of powerful feedback in ULIRGs', 16.7 hours

- PI : 'Constraining the mass of the fastest molecular outflow in the local universe', 8.4 hours

**Northern Extended Millimeter Array (NOEMA):**

- PI: ‘Probing molecular gas excitation in a ‘normal’ star-forming galaxy at  $z = 3.2$ ’, 12.3 hours

#### **Expanded Very Large Array (EVLA):**

- PI : Impact of the most extreme AGN-driven molecular outflow on its host galaxy, 6.3 hours
- PI : ‘Using dense gas observations at high redshift to test star formation paradigms’, 12.1 hours
- PI : ‘Establishing OH masers as a molecular outflow diagnostic’, 12.6 hours
- Co-I: ‘Testing the VLA as a Molecular Outflow Machine’, 2 hours
- Co-I: ‘Confirming detections of molecular absorption in a blind VLA absorption survey’, 7.5 hours

#### **Hubble Space Telescope (HST)**

- PI : Impact of the most extreme AGN-driven molecular outflow on its host galaxy (Joint VLA/HST proposal), 2 orbits

#### **NuSTAR**

- PI : “Probing the hidden AGN behind the most energetic molecular outflow”, 100 ks

#### **Selected Talks and Conference presentations**

- Contributed talk, Astrophysical Frontiers in the Next Decade and Beyond, Portland, 2018
- Contributed talk, Greater IPAC Science Symposium (GISS), IPAC, Caltech, Pasadena, 2018
- Talk, Science Enabled by Novel Infrared Instrumentation, Cornell, 2017
- Seminar, Department of Astronomy, Caltech, Pasadena, 2018
- Poster, American Astronomical Society Meeting, Washington DC, January, 2018
- Poster, The origin of galaxies, stars, and planets in the era of ALMA, 2018

Regular speaker at the weekly galaxy lunch series at the Department of Astronomy, Cornell University, and the Graduate student and postdoc seminar series.

## Teaching Experience

- Astro 1101/1103 : Fall 2015, 2016, 2018
- Astro 2201 : Spring 2015, Spring 2016
- Astro 2202 : Spring 2017