Ayushi Singh

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Education

Ph.D. in Astronomy & Astrophysics
David A. Dunlap Department of Astronomy and Astrophysics, University of Toronto *2015–Present*

Mauna Kea Summer School
Dunlap Institute for Astronomy and Astrophysics, University of Toronto *Summer 2016*

Dunlap Summer School: Introduction To Astronomical Instrumentation
Dunlap Institute for Astronomy and Astrophysics, University of Toronto *Summer 2013*

H.B.Sc. in Astronomy and Astrophysics Specialist, and Mathematics Minor
University of Toronto *2011–2015*

Doctoral Thesis

Title: *Analysis of the Stability of Star Forming Regions in the Milky Way: Using Theory, Observations and Simulations*

Supervisors: Prof. Christopher Matzner and Prof. Peter Martin

Undergraduate Thesis

Title: *Examination of small filamentary structure in Serpens South star-forming region.*

Supervisors: Dr. Rachel Friesen and Prof. Peter Martin

The project involved performing data reduction, imaging and analysis on Ammonia data from Very Large Array Telescope. I was specifically looking at the small filament in Serpens South region.

Other Research Experience

Graduate

Graduate Research Course
Department of Astronomy & Astrophysics *2016*
Examining various methods to calculate radius and velocity dispersion of molecular clouds to estimate virial parameter
Supervisor: Prof. Christopher Matzner

Graduate Research Course
Department of Astronomy & Astrophysics *2015–2016*
Analyzing Morphology of Molecular Clouds using Dragonfly Telephoto Array data in the Optical and Herschel Far-infrared data
Supervisor: Prof. Peter Martin

Undergraduate

Undergraduate Research Assistant
Canadian Institute for Theoretical Astrophysics *Summer 2014*

Creating a pipeline to generate high-resolution column density maps of molecular clouds using Herschel data of Cepheus.

Undergraduate Research Assistant
Department of Astronomy & Astrophysics *Summer 2013*
Resolving and cataloguing molecules in a star forming molecular cloud using the software GILDAS.

Publications

Singh, A., Matnzer, C. D., et al., "Are Massive Dense Clumps Truly Subvirial? A New Analysis Using Gould Belt Ammonia Data", 2021, ApJ, 922, 87, (12 pg.)

Chen, C.-Y., Behrens, E., [et al. including **Singh, A.**], "Relative alignment between dense molecular cores and ambient magnetic field: the synergy of numerical models and observations", 2020, MNRAS, 494, 2, (1971 pg.)

Keown, J., Di Francesco, J., [et al. including **Singh, A.**], "KFPA Examinations of Young STellar Object Natal Environments (KEYSTONE): Hierarchical Ammonia Structures in Galactic Giant Molecular Clouds", 2019, ApJ, 884, 4 (45 pg.)

Singh, A., Matzner, C. D., & Jumper, P. H., "Virial Ratio: Direct Estimation from Molecular Cloud Data and the Challenges of Improving Accuracy", 2019, ApJ, 878, 22 (7 pg.)

Chen, H., Pineda, J. E., [et al. including **Singh, A.**], "Droplets I: Pressure-Dominated Sub-0.1 pc Coherent Structures in L1688 and B18", 2019, ApJ, 877, 93 (58 pg.)

Keown, J., Di Francesco, J., [et al. including **Singh, A.**], "The Green Bank Ammonia Survey: Observations of Hierarchical Dense Gas Structures in Cepheus-L1251", 2017, ApJ, 850, 3 (24 pg.)

Kirk, H., Friesen, R. K., [et al. including **Singh, A.**], "Dense Cores Under Pressure in Orion A", 2017, ApJ, 846, 144 (19 pg.)

Friesen, R. K., Pineda, J. E., [et al. including **Singh, A.**], "The Green Bank Ammonia Survey (GAS): First Results of NH3 Mapping the Gould Belt", 2017, ApJ, 843, 63 (26 pg.)

Awards

Ontario Graduate Scholarship
University of Toronto *2018–2019*

Frank S. Hogg Scholarship
University of Toronto *2018*

C. A. Chant Fellowship
University of Toronto *2016–2017*

University College In-course Scholarship
University of Toronto *2014*

NSERC Undergraduate Student Research Award
University of Toronto *2013*

Conferences Talks

Women in Physics Canada 2019
Montreal, QC *June 2019*
Virial Stability of Molecular Clouds:Direct Estimation of Gravitational and Kinetic Energy from Observations

CASCA 2018
Victoria, BC *May 2018*
Virial Stability of Molecular Clouds:Direct Estimation of Gravitational and Kinetic Energy from Observations

Conference Poster

CASCA 2021
Toronto, ON *June 2021*
Are massive dense clumps truly sub-virial? A new analysis using Gould Belt ammonia data

CASCA 2020
Toronto, ON *June 2020*
Virial Ratios of Gould Belt Molecular Clouds: Are massive clouds truly sub-virial?

CASCA 2019
Montreal, QC *June 2019*
Using Abel's Reconstruction to Extract Dense Regions from Observed Molecular Clouds

Teaching

In-class Teaching Assistant
AST101: The Sun and its Neighbours *2017-2020*
AST201: Stars and Galaxies

- Leading tutorials
- Marking midterm and final exams
- Exam invigilation
- Assisting at campus observatory nights
- Marking project plans

Teaching Assistant
AST251: Life on Other Worlds *Spring 2019*

- Making questions for weekly homework
- Marking assignments, midterm and final exams
- Exam invigilation

Teacher Assistant: Head Marker
AST101: The Sun and its Neighbours *2015-2016*
AST201: Stars and Galaxies

- Lead the marking of midterm and final
- Organize and sort midterm paper for 1300+ students
- Compile midterm and final for all students

Professional Development

TATP Teaching Fundamentals Certificate
Workshop includes: *2018-2019*

- Helping Students Connect with Resources: Learning Strategists at UofT
- Women in STEM: Teaching and Learning Roundtable
- Cellphilms as Pedagogy
- Preparing Your Teaching Dossier
- Equity in your Classroom: Basic Principles
- Setting Students up for Success: Skills-Based Learning in Entry Level Tutorials

Teacher Assistant Training Program Non-Certificate Courses
Workshop includes: *2016*

- Discussion Based Tutorials for the Sciences & Engineering

Relevant Professional Positions

Astronomy Library Assistant
Department of Astronomy & Astrophysics, University of Toronto *Summer 2015*

- Re-shelved all the books and catalogues
- Cataloguing astronomy artefacts and journals
- Sorting and shelving astronomy literature
- Aiding with signing-in and signing-out of literature
- Binding astronomy journals

Outreach

Girls SySTEM Mentorship Program
Queen's University *2019–2020*

- Mentor a female high school student and encourage her in the field of science.

Girls in STEM Workshop Co-Leader
University of Toronto *2018–2019*

- Encourage girls from grades 6-9 in the field of astronomy through hands-on activities.

AstroTours Keynote Co-Director
AstroTours, University of Toronto *2016–2018*

- organized the annual Astronomy Keynote Lecture

Symposium Director
Astronomy and Space Exploration Society, University of Toronto *2012–2015*

- organized the annual Astronomy Symposium that hosted three speakers from all over the world to come and give public lecture

Various Outreach Events
Events include: *2012–Present*

- Planet Party Panel Discussion organized by Dunlap Institute
- August 2017 Solar Eclipse at the Canadian National Exhibition
- March 2016 March Break Event at the ROM
- September 2016 "Super Blood Moon" event
- Public talks organized by AstroTours
- Sidewalk Astronomy
- Science Rendezvous
- Public talks organized by Astronomy and Space Exploration Society