

# Kenny X. Van

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## Research Interests

stellar astrophysics, stellar multiplicity, high energy astrophysics, stellar populations, hydrodynamics, numerical methods

## Education & Employment

### University of Alberta

PHD CANDIDATE IN PHYSICS

- Thesis: "Binary Evolution and Magnetic Braking"
- Advisor: Professor Natalia Ivanova

Edmonton, Canada

Sept. 2017 - Present

### University of Alberta

MASTER OF SCIENCE IN PHYSICS

- Thesis: "Select Topics in Mass Transfer and Magnetic Braking"
- Advisor: Professor Natalia Ivanova

Edmonton, Canada

Sept. 2015 - Aug. 2017

### University of Alberta

UNDERGRADUATE DEGREE IN PHYSICS

- Major: Astrophysics

Edmonton, Canada

Sept. 2010 - Apr. 2015

## Research

### The Effect of Magnetic Braking on Low Mass X-ray Binaries

GRADUATE RESEARCH

- A project focusing on different magnetic braking prescriptions on low mass X-ray binaries. I show that the commonly used prescription is ineffective in reproducing many observed systems.

Edmonton, Canada

Sept. 2017 - Present

### Select Topics in Mass Transfer and Magnetic Braking

GRADUATE RESEARCH

- Investigate an novel binary formation channel with a semi-degenerate donor
- Examine the stability criteria in binary systems with a massive donor

Edmonton, Canada

Sept. 2015 - Aug. 2017

### Black Hole Binaries in Globular Clusters

UNDERGRADUATE RESEARCH

- Supervised by professor Natalia Ivanova at the University of Alberta
- Simple project using **MESA** to simulate a collection of black hole binaries.

Edmonton, Canada

Fall 2014

### Finding a Pattern in the Outbursts of SS Cygni

UNDERGRADUATE RESEARCH

- Supervised by professor Gregory Sivakoff at the University of Alberta
- Studied the outbursts of a well observed cataclysmic variable SS Cygni using python code.

Edmonton, Canada

Winter 2013

## Awards

2018 **\$7500**, Queen Elizabeth II Scholarship

2016 **\$1500**, FGSR Graduate Travel Grant

## Teaching Experience

### Senior Undergraduate / Graduate Astronomy Course

TEACHING ASSISTANT

- Provided ongoing support for students in the course in running stellar simulations.
- Aided students in performing analysis of numerical outputs from stellar simulations.
- Provide teaching support for this course every Fall semester from 2016 onwards.

University of Alberta

Sept. 2019 - Dec. 2019

## Senior Undergraduate / Graduate Computational Physics Course

TEACHING ASSISTANT

- Provided computing and coding support to students using python and jupyter notebooks.
- Graded the assignments of the students.

University of Alberta

Sept. 2019 - Dec. 2019

## Undergraduate Astronomy Course

TEACHING ASSISTANT

- Graded assignments for an undergraduate astronomy course in a timely manner.

University of Alberta

Jan. 2018 - Mar. 2019

## Undergraduate Physics Lab

TEACHING ASSISTANT / LAB SUPERVISOR

- Supervised and graded an undergraduate physics lab covering classical physics experiments.

University of Alberta

Sept. 2015 - Apr. 2016

# Proposals

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## Resources for Research Groups Competition

COMPUTE CANADA

2019

- Awarded 314 CUP core years and 6 GPU core years as a member of the Ivanova research group.

# Publications

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## Evolving LMXBs: CARB Magnetic Braking

*Astrophysical Journal Letters*

VAN, K. X., IVANOVA, N.

Nov. 2019

- We derive and introduce a new magnetic braking scheme which can effectively reproduce a sample of well studied observed LMXBs.

## Low Mass X-ray Binaries: The Effects of Magnetic Braking Prescription

*Monthly Notices of the Royal  
Astronomical Society*

VAN, K. X., IVANOVA, N., HEINKE, C. O.

Dec. 2018

- A study of the most commonly used magnetic braking prescription and how effectively this prescription can reproduce observed LMXBs.
- We definitively show that the most commonly used prescription fails to reproduce observed systems and should not be used.

## Formation of Black Hole X-Ray Binaries With Non-Degenerate Donors in Globular Clusters

*Astrophysical Journal Letters*

IVANOVA, N., DA ROCHA, C. A., VAN, K. X., NANDEZ, J. L. A.

Jul. 2017

- Presented an alternative method in producing black hole X-ray binaries where a black hole captures a subgiant donor and strips a significant amount of mass off the donor.

## Stability of mass transfer from massive giants: double black-hole binary formation and ultra-luminous X-ray sources

*Monthly Notices of the Royal  
Astronomical Society*

PAVLOVSKII, K., IVANOVA, N., BELCZYNSKI, K., VAN, K. X.

Feb. 2017

- Showed that there is a range where mass transfer from massive giants onto a black hole is stable.
- This significantly reduced the simulated BH-BH binary formation rate to fall in line with LIGO observations

# Presentations & Talks

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## Inverse Population Synthesis: Searching for the Origins

Montreal, Canada

POSTER PRESENTATION AT CASCA MONTREAL

Jun. 2019

- Present a new magnetic braking scheme that effectively reproduces a subset of well studied low-mass X-ray binaries.

## pgstar

Santa Barbara, USA

PRESENTATION AT MESA SUMMER SCHOOL

Aug. 2018

- Gave a tutorial on the plotting tools built into MESA.

## Low Mass X-ray Binaries: Population at Roche Lobe Overflow

Victoria, Canada

POSTER PRESENTATION AT CASCA VICTORIA

May. 2018

- Showed that the commonly used magnetic braking prescription cannot reproduce many observed systems. Modifications to the default magnetic braking scheme must be made in order to reproduce many observed systems.

## Low Mass X-ray Binaries: Population at Roche Lobe Overflow

Edmonton, Canada

POSTER PRESENTATION AT CASCA EDMONTON

May. 2017

- Showed that the commonly used magnetic braking prescription cannot reproduce many observed systems.

## Poster Presentation at the UCSB

Santa Barbara, Canada

STABILITY OF MASS TRANSFER FROM MASSIVE GIANTS

Mar. 2017 - May. 2017

- Showed a novel binary formation method involving a black hole accretor and a semi-degenerate donor.

## Poster Presentation at Binary Stars in Cambridge

Cambridge, England

STABILITY OF MASS TRANSFER FROM MASSIVE GIANTS

Jul. 2016

- Showed a novel binary formation method involving a black hole accretor and a semi-degenerate donor.

## Conferences & Workshops

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### CASCA Montreal

Montreal, Canada

CONFERENCE ATTENDEE

Jun. 2019

- Gave a poster presentation showing a new magnetic braking prescription which can reproduce a subset of observed persistent low mass X-ray binaries.

### Westgrid Summer School

Calgary, Canada

WORKSHOP ATTENDEE

May. 2019

- Participated in a computational summer school covering machine learning, data mining, and scientific computing.
- Website: <https://westgrid.github.io/calgarySummerSchool2019/>

### MESA Summer School

Santa Barbara, USA

SUMMER SCHOOL TEACHING ASSISTANT

Aug. 2018

- Introduced **MESA** and gave a tutorial on the in-built plotting tools.
- Provided teaching support for the other courses offered at the summer school
- Website: [http://cococubed.asu.edu/mesa\\_summer\\_school\\_2018/](http://cococubed.asu.edu/mesa_summer_school_2018/)

### CASCA Victoria

Victoria, Canada

CONFERENCE ATTENDEE

May. 2018

- Gave a poster presentation showing that the commonly used magnetic braking schemes are ineffective at reproducing observed binary systems.
- Showed that modifications to the default magnetic braking scheme must be made in order to reproduce many observed systems.

### CASCA Edmonton

Edmonton, Canada

CONFERENCE ATTENDEE

May. 2017

- Gave a poster presentation showing preliminary results suggesting that the default magnetic braking used in simulation is ineffective in reproducing observed binaries.

### The Mysteries and Inner Workings of Massive Stars

Santa Barbara, Canada

CONFERENCE ATTENDEE

Mar. 2017 - May. 2017

- Gave a poster presentation showing a novel binary formation method involving a black hole accretor and a semi-degenerate donor.

### Binary Stars in Cambridge

Cambridge, England

CONFERENCE ATTENDEE

Jul. 2016

- Gave a poster presentation showing a novel binary formation method involving a black hole accretor and a semi-degenerate donor.

## Professional Service

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### Graduate Representative

CASCA REPRESENTATIVE

2018 - Present

- Graduate representative at of the Canadian Astronomical Society (CASCA)
- Represented the astronomy students at the University of Alberta as a member of the graduate student council.

### UAlberta Astronomy Group

MEETING ORGANIZER

2017 - Present

- Organized and maintained the astronomy journal club and seminars of the University of Alberta astronomy group.

### University of Alberta Observatory

OBSERVATORY VOLUNTEER

Jan. 2017 - Mar. 2017

- Supervised public observing and school visits to the observatory.
- Gave talks on solar winds and meteorites accessible to the public or elementary aged students.