Mario G. **Ivanov**

M.Sc. in Astrophysics

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Education

Master of Science in Physics
Sep 2018 – Jan 2021

University of Alberta — *Edmonton, AB*

- Thesis: "Physics of Black Hole Formation in Failed Supernovae"
- Advisors: Rodrigo Fernández & Greg Sivakoff

Bachelor of Science in Physics
Sep 2015 – Jun 2018

University of Alberta — *Edmonton, AB*

- Major: Astrophysics with First Class Honours

Diploma in Dental Hygiene
Sep 2011 – Jun 2015

University of Alberta — *Edmonton, AB*

Skills

Languages	Python, Fortran, LaTeX, Matlab, Bash, Shell
Libraries/Tools	Pandas, Numpy, Matplotlib, Scikit-learn, Markov Chain Monte Carlo
Data Processing	High-performance Computing (Compute Canada), Python Parallelization

Research

Physics of Black Hole Formation from Failed Supernovae
Sep 2018 – Jan 2021

Graduate advisor: Rodrigo Fernández

- Completed a computationally-heavy project about the birth of black holes.
- Used open-source software, Fortran, Bash, and computing clusters (Compute Canada) to run physics simulations.
- Used Python, FLASH, and VisIt to visualize and process the simulation data.
- Wrote and edited a thesis and a journal article about my project.

Data Processing Pipeline for AstroSat's LAXPC Instrument
Sep 2018 – Jan 2021

Graduate advisor: Greg Sivakoff

- Wrote a pipeline for processing data from AstroSat's LAXPC instrument.
- Used Python to read, process, and analyze level 1 (raw) data from the satellite.

The X-ray Emissivity of Low-Density Stellar Populations
May 2017 – Jan 2020

Undergraduate supervisor: Craig Heinke

- Completed an exploratory, statistical project about the X-ray emission from different stellar environments.
- Used Python to process our data and apply modern statistical techniques (like Markov Chain Monte Carlo analysis) to it.
- Explored statistical correlations with scientific scrutiny.
- Wrote and edited a journal article about the project.

Upgrading the Undergraduate Physics Labs
May 2016 – Apr 2017

Undergraduate supervisor: Mark Freeman

- Improved previous physics lab experiments with newer technology or methodology.
- Wrote and edited lab manuals, later to be used by undergraduates to complete the physics labs.
- Proposed new ideas for physics lab experiments that would teach concepts otherwise missed.

Publications

Mass ejection in failed supernovae: EOS and neutrino loss dependence
Jan 2021

M. G. Ivanov, Rodrigo Fernández

- Published in the Astrophysics Journal. (Click here)
- We find that with more realistic equations-of-state, we obtain more pessimistic observational signatures for failed supernovae.

The X-ray Emissivity of Low-Density Stellar Populations

Jan 2020

C. O. Heinke, **M. G. Ivanov**, E. W. Koch, et al.

- Published in Monthly Notices of the Royal Astronomical Society. (Click here)
- In low-density environments, we find significant correlations between X-ray emissivity and binary fraction, metallicity, and density.

Presentations & Talks

The X-ray Emissivity of Low-Density Stellar Populations

Jun 2017 – Aug 2019

C. O. Heinke, **M. G. Ivanov**, E. W. Koch, et al.

- Presented my research at several conferences:
  - CASCA (Canadian Astronomical Society) 2019 Poster — Montreal, QC
  - APS (American Physical Society) April Meeting 2019 Speaker — Denver, CO
  - SEDS (Students for the Exploration and Development of Space) Ascention 2019 Conference Speaker — Edmonton, AB
  - University of Alberta 2017 Summer Research Poster — Edmonton, AB
- I created presentations and gave talks to large audiences of physicists at conferences.

"Are we alone in the Universe?"

Oct 2017

M. G. Ivanov — *Bon Accord, AB*

- I was the keynote speaker at the "Under the Stars" event held at the Prairie Gardens in Bon Accord, Alberta.
- I gave a one-hour general public presentation about life in our universe.

Employment

Self-Employed Academic Tutor

Oct 2013 – Present

In-person and online — *Edmonton, AB*

- Implement personalized learning plans for each student in a one-on-one environment.
- Communicate effectively to find and solve problem areas clearly.
- Adapt to each students' learning style to most effectively teach concepts.
- Teach physics, math, engineering, and all high-school natural sciences.

Graduate Physics Teaching Assistant

Sep 2018 – Jan 2021

University of Alberta Physics Department — *Edmonton, AB*

- Held office hours for undergraduate and graduate students to ask me questions related to their work.
- Explained concepts in a clear and concise manner, without "just giving" the answer.
- Marked assignments fairly while providing useful personalized feedback on areas of difficulty for each student.

Registered Dental Hygienist

Sep 2015 – Jun 2018

Southwest Smiles Dental Clinic — *Edmonton, AB*

- Adapted to and maintained quality work in a quick-paced environment.
- Executed all routine Hygiene treatment to clients at a high standard.
- Developed professional relationships based on respect with the staff and clients.
- Performed all tasks in a team mindset to ensure enjoyable experience for clients.

Casino Games Dealer

Sep 2012 – Oct 2015

St. Albert Century Casino — *St. Albert, AB*

- Created a friendly and fun gaming environment for patrons.
- Exercised quick mental math and conflict resolution.
- Maintained professional relationships with pit bosses and game manager.

Teaching & Volunteering

Science Educator

Sep 2014 – Feb 2020

University of Alberta Observatory — *Edmonton, AB*

- Taught astronomy and physics concepts to the general public.
- Answered and discussed questions about anything astronomy or physics-related.
- Operated the observatory telescopes in the domes.
- Worked in a team of volunteers on a regular weekly schedule.

President of Science Hackerspace Student Group *Aug 2016 – May 2018*

University of Alberta Student Group *Edmonton, AB*

- Oversaw the operation of the student group in "The Shack" (located in CCIS).
- Delegated tasks to appropriate VP members for model approvals, event scheduling, and student tracking.
- Held weekly progress meetings to move the student group in the right direction.
- Helped teach students how to use the tools (3D printers, CNC mill, laser cutter/engraver, and more) in our lab.

Ex-Alta 2 Communications Team Member *Dec 2016 – Dec 2017*

University of Alberta Student Group *Edmonton, AB*

- Researched open-source communications technologies for CubeSat satellites.
- Worked with communications team to design and assemble open-source designs.
- Worked with the rest of the Ex-Alta 2 team to meet project milestones.

Undergraduate Astronomy Society VP Finance *Sep 2015 – Sep 2017*

University of Alberta Student Group *Edmonton, AB*

- Accounted for all financial transactions of the UAS student group.
- Worked with the rest of the executive committee to plan and organize events.
- Created monthly financial reports and documented all transactions to be reviewed annually.

Painter and Builder *Apr 2013 – May 2014*

Habitat for Humanity *Edmonton, AB*

- Volunteers build houses for low socioeconomic status communities.
- Helped build fences, decks and walls for houses with other volunteers.
- Painted sections of houses before they were delivered and assembled at their designated locations.

Awards

$1000	**Jason Lang Scholarhip**, for academic achievement based on GPA.	*2017*
$500	**Helen Tkachenko**, for outstanding achievement in the Russian language.	*2013*
$1000	**Jason Lang Scholarhip**, for academic achievement based on GPA.	*2013*
$1000	**Jason Lang Scholarhip**, for academic achievement based on GPA.	*2012*
$1000	**Academic Excellence Scholarship**, for superior academic achievement.	*2011*

Conferences & Workshops

CASCA (Canadian Astronomical Society) 2019 *Jun 2019*

Conference Attendee *Montreal, QC*

- Gave a poster presentation about work on the X-ray emissivity of low-density stellar populations.
- Website: `http://www.physics.mcgill.ca/casca2019/`

WestGrid Research Computing Summer School *May 2019*

Workshop Attendee *Calgary, AB*

- Participated in a week-long Python bootcamp covering machine learning, data mining, and scientific computing.
- Website: `https://westgrid.github.io/calgarySummerSchool2019/`

APS (American Physical Society) *Apr 2019*

Conference Attendee *Denver, CO*

- Gave a talk about my work on the X-ray emissivity of low-density stellar populations.
- Website: `http://meetings.aps.org/Meeting/APR19/Content/3673`

SEDS (Students for the Exploration and Development of Space) Ascension *Mar 2019*

Conference Attendee *Edmonton, AB*

- Gave a talk about my work on the X-ray emissivity of low-density stellar populations.
- Website: `https://seds.ca/ascension2019/`

CASCA 2017 *May 2017*

Conference Organizer *Edmonton, AB*

- Helped organize all the different conference rooms for talks and attended sessions during my time off.
- Website: `https://sites.google.com/a/ualberta.ca/casca2017/`