

ALEJANDRO VIGNA-GÓMEZ

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RESEARCH POSITIONS

MPA Fellow, Max-Planck Institute for Astrophysics (MPA)	Dec 2022 – Present
Postdoctoral Fellow, Niels Bohr Institute (NBI)	Oct 2019 – Nov 2022

EDUCATION

University of Birmingham	Supervisor: Ilya Mandel
PhD in Physics and Astronomy	Oct 2015 – Sep 2019
Thesis title: <i>On the evolution and fate of interacting massive binary stars</i>	
Universidad Autónoma de San Luis Potosí	
BS Physics	Aug 2011 – Apr 2015

RESEARCH INTERESTS AND EXPERIENCE

Evolution and fate of massive stars in single and multiple-star systems. Study of various transient astronomical phenomena which occur in the field, such as X-ray binaries (e.g., high-mass XBs, Be XBs), common-envelope events (e.g., luminous red novae and double-compact object progenitors), stellar collapse (SNe, e.g. core-collapse SNe, stripped-envelope SNe, pair-instability SNe) and gravitational-wave sources (stellar-mass double compact object mergers). I am particularly interested in systems which will become **double neutrons stars** similar to the ones observed in the Milky Way, **black-hole binaries** as observed in the Local Group and **double compact object mergers** such as the ones detected by the LIGO/Virgo detector network. I develop and use COMPAS, a rapid population synthesis code, to study different evolutionary stages of binary evolution. I have used MESA for detailed modeling of **stellar mergers** and GADGET2 for 3D hydrodynamical modeling of **fallback supernovae** in close binaries.

SUPERVISION EXPERIENCE

★ denotes I designed and supervised the work carried out by the student; otherwise I acted as co-supervisor.

† denotes that the student gained co-authorship in a peer-reviewed publication that resulted as part of their work.

★ K. Nathaniel. PhD student at Rochester Institute of Technology	2023 – Present
R. Valli. PhD student at the MPA	2023 – Present
★ E. Munguía-González. PhD student at Penn State University	2021 – Present
† S.L. Schröder. PhD student at the NBI	2019 – 2022
I.S. Hansen. Masters student at the University of Copenhagen	2020 – 2021
† M. Wassink. Masters student from Radboud University	2019
† M. Lau. Masters student from Oxford University	2018-2019
S. Kingdon & A. Perry. Masters students from the University of Birmingham	2017-2018
† S. Shortt. Undergraduate summer student from Georgia College and State University	2018
† E. Butler. Undergraduate summer student from the University of Birmingham	2018
† K. Boyett & F. Gittins. Masters students from the University of Birmingham	2016-2017

† K. Nathaniel. Undergraduate summer student from Virginia Tech	2017
† I. Romero-Shaw. Undergraduate summer student from the University of Birmingham	2017
M. Brown & R. Sathyaprakash. Masters students from the University of Birmingham	2015–2016
† D. Perkins. Undergraduate summer student from the University of Birmingham	2016

MENTORING EXPERIENCE

Y. Song. Postdoctoral Fellow at Swinburne University of Technology	2023
S.L. Schröder. PhD student at the NBI	2019 – 2022
C. Hede. PhD student at the NBI	2021
A.N. Kolborg. PhD student at the NBI	2020 – 2021
I. Padilla-Gay. PhD student at the NBI	2019 – 2020

TEACHING AND JOB EXPERIENCE

Monash University, Melbourne

Visiting Scholar: Monash Centre for Astrophysics Jan 2019 – Sep 2019

School of Physics and Astronomy, University of Birmingham

Mathematics for Physicists 2 2015–2016, 2016–2017

Qualitative and quantitative feedback to the work of a class of 40+ group of 2nd year undergraduate students.

Gravitational-wave Astrophysics 2017–2018

Closely worked as co-supervisor of a 10+ group of 3rd year undergraduate students. The group worked on a collaborative research project focussed on analysis of gravitational-wave signals, their astrophysical progenitors and detectability.

Facultad de Ciencias, Universidad Autónoma de San Luis Potosí

Electromagnetism Spring 2015

Teaching assistant of a 1st year undergraduate class. I was in charge of organising the problem sessions and course examinations.

Linear Algebra Fall 2014

Substitute teacher of a 2nd year undergraduate class. I was also in charge of grading the course examinations.

Classical Mechanics Fall 2013

Substitute teacher of a 2nd year undergraduate class. I was also in charge of grading the course examinations.

Instituto de Física, Universidad Autónoma de San Luis Potosí

Research Assistant: Cold Atoms Laboratory 2012–2014

Assembly and testing of a radio frequency amplifier. Assembly of experimental setup of laser locking circuit through RF in order to perform Raman transitions on Rubidium 87.

Research Assistant: Theoretical Physics Group 2014–2015

Assistance in graphics modeling and computational analysis. General assistant to research and academic matters.

University of California Santa Cruz, Santa Cruz, California

Visiting Scholar: Astronomy & Astrophysics Department Summer 2014, Summer 2013

Study of relativistic bow shocks produced by gamma-ray burst progenitors. Numerical simulations made in order to analyse geometry, internal energy distribution, emitted flux and general properties of these systems.

INVITED SPEAKER CONFERENCES

European Astronomical Society (EAS) Annual Meeting 2023 (Krakow)	Jul 2023
Newest Results from LIGO O3 , NBI (Copenhagen)	Nov 2020
DKGWEM-20 , NBI (Copenhagen)	Jan 2020
Frontiers of the Physics of Massive Stars (Ensenada)	Jul 2018

CONFERENCES AND WORKSHOPS

MIAPbP program on “Stellar magnetic fields”	
Invited Participant (Garching)	Oct-Nov 2023
Lorentz Center program on “Supernova remnants in complex environments”	
Invited Participant (Leiden)	Oct 2023
Kavli Summer Program in Astrophysics 2023	
Postdoctoral Fellow and Supervisor (Garching)	Jun–Aug 2023
MIAPbP program on “Interacting Supernovae”	
Contributed Talk (Garching)	Feb-Mar 2023
3rd ENGRAVE Collaboration meeting	
Conference Talk (Garching)	Feb 2023
NBIA Summer School on Gravitational Wave Astrophysics	
Lecturer. NBI (Copenhagen)	Aug 2021
Amaldi14	
Conference Talk. Virtual Meeting	Jul 2021
Annual Danish Astronomy Meeting (ADAM)	
Conference Talk. Virtual Meeting	Jun 2021
European Astronomical Society (EAS) Annual Meeting	
Conference Talk. Virtual Meeting	Jul 2020
Simulating Stars Summer School	
Teaching assistant to Manos Chatzopoulos (Beijing)	Jun 2018
Deciphering the Violent Universe	
Conference Talk (Playa del Carmen)	Dec 2017
Kavli Summer Program in Astrophysics 2017	
Student Fellow. NBI (Copenhagen)	Jul–Aug 2017
Binary Stars in Cambridge	
Conference Talk. University of Cambridge (Cambridge)	Jul 2016
“Look & Listen” Astrophysics School	
Student Fellow (Playa del Carmen)	Jan 2014

TALKS, SEMINARS AND COLLOQUIA

NBIA Astroparticle Seminar , NBI (Copenhagen)	Sep 2023
MPA Institute Seminar , MPA (Garching)	Jun 2023
Garching Supernova Meeting , MPA (Garching)	May 2023
Stellar dynamics and evolution group meeting , Lund University (Lund)	Mar 2022
Seminario de Astrofísica , INAOE (México)	Jan 2022
SESTAS , MPA (Garching)	Nov 2021
SeBa Group Meeting (Online)	Oct 2021
HEAP Seminar , UNAM (México)	Aug 2021

IA/FORTH Seminar , University of Crete (Crete)	Jun 2021
Astronomy on Tap (Copenhagen)	Feb 2021
Radboud University Colloquia (Nijmegen)	Apr 2020
Stellar Astrophysics Group Meeting , AlfA (Bonn)	Feb 2020
Compact Objects for All , Lund University (Lund)	Jan 2020
Astrophysics Colloquia , University of Melbourne (Melbourne)	Aug 2019
MoCA Seminar , Monash University (Melbourne)	Aug 2019
Stellar Group Meeting (SINS) , Monash University (Melbourne)	Jul 2019
Avi Loeb's ITC Group Meeting , Harvard University (Boston)	Dec 2018
GRITTS Seminar , MIT (Boston)	Dec 2018

OUTREACH AND SERVICES

Astronomy & Astrophysics (A&A) - Referee	2023–Present
International Max Planck Research Schools - Application Reviewer	2023
Canada France Hawaii Telescope - Proposal Reviewer	2023
3,2,1: Massive Triples, Binaries and Mergers 2023 conference - SOC	2023
MPA Postdoctoral fellowships in Astrophysics - Application Reviewer	2022–Present
Acta Astronomica - Referee	2022–Present
The Astrophysical Journal (ApJ) - Referee	2022–Present
The Astrophysical Journal Letters (ApJL) - Referee	2022–Present
Irish Research Council Laureate Awards - Proposal Reviewer	2022
Monthly Notices of the Royal Astronomical Society (MNRAS) - Referee	2021–Present
Physical Review D (PRD) - Referee	2020–Present
Astronomy on Tap: Copenhagen - Co-organizer	2020–2021
Transient Tuesday , NBI	2019–2021
Co-organizer and host of a fortnightly discussion forum on theory and observations of transients.	
OzGrav - Research affiliate	2019–Present
Whiteboard Sessions , Monash University - Creator	2019–Present
A weekly meeting where general astrophysics are studied from a back-of-the-envelope approach. Ongoing after my departure.	
Astronomy in the City , University of Birmingham	Jan 2018
Talk to a general public audience (300+ assistants). Astronomy in the City is aimed at secondary school age and above (Year 7+).	
Science Seminar of the Mexican Society , University of Birmingham	Oct 2017
Talk to an audience of approximately 30 researchers and students from different disciplines.	

AWARDS, GRANTS, & HONOURS

GWIC-Braccini Prize - Honorable Mention	2019
PHAROS COST Action Short-Term Scientific Mission Grant (€700)	2018
KAVLI Summer Program in Astrophysics Student Fellow	2017
Universitas 21 PhD Scholarship (£1,500)	2017
Royal Astronomical Society Travelling Grant	2017
Royal Astronomical Society Travelling Grant	2016
CONACYT Fellowship Recipient (£87,760)	2015-2019
John N. Bahcall Award in Physics	2013

MEDIA AND PRESS RELEASES

News at the <i>CNET.com</i> (English)	Jul 2022
‘First of Its Kind’ Triple Star System Detected in Deep Space	
News at the <i>NBI</i> (English)	Jul 2022
Compact, massive triple star system detected for the first time	
Press article at <i>Sky & Telescope</i> (English)	Jul 2022
This Triplet of Stars Was Once a Quartet	
Press article at <i>Phys.org</i> (English)	Oct 2021
Astrophysicists explain the origin of unusually heavy neutron star binaries	
Press article at <i>El Universal</i> (Spanish)	Sep 2021
Diplomacia Digital: de Ministros, Tweets, y Bots	
Press article at <i>Astronomy</i> magazine (English)	Mar 2021
Triple star recipe for supersized stellar-mass black holes	
Research brief at <i>OzGrav’s</i> webpage (English)	Jan 2021
Massive Stellar Triples Leading to Sequential Binary Black-Hole Mergers in the Field	
Video from Instituto de Astronomía - UNAM (Spanish)	May 2020
https://www.facebook.com/watch/?v=536613103704977	
Press article at <i>Uniavisen</i> (Danish)	Apr 2020
Gigantisk stjerneeksplosion skubber til forskernes viden om supernovaer	
Press article at <i>Videnskab</i> (Danish)	Apr 2020
Teori: Rekordlysende supernova kan stamme fra to stjerner	
Press article at <i>Space Australia</i> (English)	Mar 2020
Modelling the evolution of double neutron stars	

TECHNICAL SKILLS

Programming Languages	C, C++, Fortran90, Python, LaTeX
Software	MATLAB, COMPAS, Mathematica, GADGET2, MESA

LANGUAGES

Spanish - Native Language
English - Advanced
German - Basic

PUBLICATION LIST

NASA/ADS

REFERENCES

1. Prof. Ilya Mandel, doctoral advisor: Ilya.Mandel@monash.edu
2. Prof. Selma E. de Mink, current employer: sedemink@mpa-garching.mpg.de
(Please send request for letters at: deMink_office@mpa-garching.mpg.de)
3. Prof. Enrico Ramirez-Ruiz, former employer: enrico@ucolick.org
4. Dr. Silvia Toonen, mentor: toonen@uva.nl
5. Dr. Stephen Justham, mentor: sjustham@mpa-garching.mpg.de