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## Martin Heusen

Lebanese Citizen  
 Permanent resident of Canada  
 DOB : 14th of March 1991



cosmic ray transport - plasma physics - magnetic turbulence - computational astrophysics

### Education and Diplomas

2012 - 2016	<b>PhD in theoretical astrophysics</b> from The <u>University of Manitoba</u> (Canada). Status: awarded with distinction, GPA: 4.25/4.5. Topic: Analytical and numerical investigation of charged particles interacting with turbulent magnetic fields. Supervisor: <u>Prof. Andreas Shalchi</u>
2011 - 2012	<b>MSc by Research</b> from the <u>Jodrell Bank Centre for Astrophysics</u> at <u>The University of Manchester</u> (UK). Status: awarded with distinction. Topic: Numerical modelling of accelerated charged particles by magnetic reconnection in solar flares. Supervisor: <u>Prof. Philippa Browning</u> .
2008 - 2011	<b>BSc in General Physics</b> from <u>The Lebanese University</u> (Lebanon), passed with distinction
2005 - 2008	<b>Baccalaureate in Science</b> , passed with distinction (Amal high school, Saida, Lebanon)

### Awards

2013 - 2016	University of Manitoba (UoM), <b>faculty of science studentship</b>
2013 - 2014	University of Manitoba, <b>international graduate student scholarship</b>
2012 - 2013	University of Manitoba, <b>physics entrance studentship</b>
2012 - 2015	Three UoM faculty of <b>graduate studies travel award</b> for <u>COSPAR</u> , <u>ICRC</u> , and <u>CAP</u> conferences and <u>CASCA</u> travel award from the <u>Canadian Astronomical Society</u>
2011 - 2012	<b>Excellence in research award</b> from the "Success Organization of Beirut" providing full funding for MSc by research studies at the University of Manchester in the UK
2011 - 2013	<b>MSc grant fund</b> from the <u>American University of Beirut</u> (AUB) to continue an MSc program in astrophysics (offer declined as plans to continue MSc in the UK were finalized)

### Administrative positions

2015 - 2016	Member of the <b>local organizing committee</b> hosting <u>CASCA2016 meeting</u> in Winnipeg
2014 - 2016	Elected twice to serve as the Physics and Astronomy Graduate Student Association ( <b>PAGSA</b> ) <b>councillor</b> . Duties include conducting meetings for the graduate student body, organizing outreach events, and organizing elections to choose graduate student executives
March 2012	Member of the Graduate Student Organizing Committee hosting the UK <u>National Astronomy Meeting</u> , NAM2012. Duties include helping in running sessions, and guiding and information
2008 - 2011	Elected three time to serve as the <b>Physics Undergraduate Representative</b> at the Lebanese University. Duties include printing course materials for students, being the contact person between administration and students, and organizing outreach events

## Teaching

2014 - 2016	Teaching assistant of General Physics 1, General Physics 2, Introduction to Astronomy 1, and Introduction to Astronomy 2 at The University of Manitoba. Duties include: lecturing, tutorials and problem solving, conducting experiments, grading, and invigilating
2013 - 2014	Teaching assistant of Graduate Electromagnetic Theory, General Physics 1, General Physics 2, and Introduction to Astronomy 1 at The University of Manitoba
2012 - 2013	Teaching assistant of Graduate Electromagnetic Theory, General Physics 1, and General Physics 2 at The University of Manitoba
2011 - 2012	Tutor of physics and mathematics for undergraduates at The University of Manchester
2008 - 2011	Tutor of physics and mathematics for undergraduates at The Lebanese University
2008 - 2010	Lab technician/Instructor of General Physics at Beirut International High School

## Publications in peer-reviewed international journals

7	<a href="#">article</a>	<b>Heusen, M.,</b> & Shalchi, A.	Simulations of energetic particles interacting with nonlinear anisotropic dynamical turbulence	Ap&SS	2016
6	<a href="#">article</a>	<b>Hussein, M.,</b> & Shalchi, A.	Simulations of energetic particles interacting with dynamical magnetic turbulence	ApJ	2016
5	<a href="#">article</a>	<b>Hussein, M.,</b> Tautz, R. C., & Shalchi, A.	The influence of different turbulence models on the diffusion coefficients of energetic particles	JGR	2015
4	<a href="#">Erratum</a>	Shalchi, A., & <b>Hussein, M.</b>	Benchmarking the unified nonlinear transport theory for Goldreich-Sridhar turbulence	Ap&SS	2015
3	<a href="#">article</a>	Shalchi, A., & <b>Hussein, M.</b>	Perpendicular diffusion of energetic particles in noisy reduced magnetohydrodynamic turbulence	ApJ	2014
2	<a href="#">article</a>	<b>Hussein, M.,</b> & Shalchi, A.	Parallel and perpendicular diffusion coefficients of energetic particles interacting with shear Alfvén waves	MNRAS	2014
1	<a href="#">article</a>	<b>Hussein, M.,</b> & Shalchi, A.	Detailed numerical investigation of the Bohm limit in cosmic ray diffusion theory	ApJ	2014

## Contributions during seminars

8	<a href="#">seminar</a> (invited)	Diffusion of energetic particles in turbulent magnetic fields	<u>TRIUMF</u> (Canada's national nuclear lab) colloquium, during my student visit to the facility	Aug. 2016
7	seminar	Reproducing galactic cosmic ray transport measurements	<u>NRC Herzberg</u> (Canada's national astrophysics facility) colloquium, during my visit to the facility	Aug. 2016
6	seminar (invited)	Extensive test-particle study of cosmic ray transport	during my visit to the space-physics group at the University of Calgary	July 2016
5	seminar	Extensive test-particle study of cosmic ray transport	during my visit to the space-physics group at the University of Alberta	June 2016

4	talk	The physics of collisionless shocks	Astro-group journal club at the University of Manitoba	Sept. 2015
3	<u>talk</u>	Numerical investigation of cosmic rays propagation in turbulent magnetic fields	Graduate student colloquium at the Department of Physics and Astronomy- University of Manitoba	Nov. 2013
2	talk	The formation of current sheets in solar flares and their role in accelerating particles	Jodrell Bank Centre for Astrophysics internal seminar	June 2012
1	talk	Forecasting solar flares	Jodrell Bank Centre for Astrophysics astro-ph journal club	April 2012

### Contributions to conferences and workshops

14	<u>Talk</u>	Heusen, M., & Shalchi, A.	Simulations of energetic particles interacting with dynamical magnetic turbulence	Canadian association of physicist (CAP) congress - Ottawa	June 2016
13	<u>Talk</u>	Heusen, M., & Shalchi, A.	The influence of turbulence on the transport of energetic particles	Canadian association of physicist (CAP)	June 2016
12	<u>Talk</u>	Heusen, M., & Shalchi, A.	PhD thesis talk: The transport of energetic charged particles in different astrophysical scenarios	Canadian astronomical society (CASCA) meeting, Winnipeg, Canada	May 2016
11	<u>Talk</u>	Hussein, M., & Shalchi, A.	Energetic particles interacting with dynamical turbulence in the solar wind: reproducing Palmer (1982) results	International cosmic ray conference (ICRC) The Hague, Netherlands	August 2016
10	<u>Poster</u>	Hussein, M., Shalchi, A., & Tautz, R. C.	Simulation of energetic particles in different turbulence models; notes on universality of transport	International cosmic ray conference (ICRC) The Hague, Netherlands	August 2015
9	<u>Poster</u>	Hussein, M., & Shalchi, A.	Perpendicular diffusion of cosmic rays in NRMHD turbulence	International cosmic ray conference (ICRC) The Hague, Netherlands	August 2015
8	<u>Talk</u>	Hussein, M., & Shalchi, A.	New dynamical turbulent model in solar winds; Palmer (1982) results reproduced	Canadian astronomical society (CASCA) meeting, Hamilton, Canada	May 2015
7	<u>Poster</u>	Hussein, M., & Shalchi, A.	The Influence of turbulence model on the transport of energetic particles	Canadian astronomical society (CASCA) meeting, Hamilton, Canada	May 2015
6	<u>Poster</u>	Hussein, M., & Shalchi, A.	Diffusion of energetic particles interacting with turbulent magnetic fields; Analytical theory and simulations	American geophysical union meeting, San Fransisco, USA	Dec. 2014
5	<u>Talk</u>	Hussein, M., & Shalchi, A.	Tracking charged particles across the universe, big data needed	Big data workshop at the University of Manitoba	Dec. 2014
4	<u>Talk</u>	Hussein, M., & Shalchi, A.	Transport of cosmic rays in the interstellar medium	American physical society, DPP meeting, New Orleans, USA	Oct. 2014

3	Talk	Hussein, M., & Shalchi, A.	Parallel and perpendicular diffusion coefficients of energetic particles in astrophysical-like turbulence	Committee on space research (COSPAR) meeting, Moscow, Russia	August 2014
2	Poster	Hussein, M., & Browning, P.	Test-particle simulations of accelerated charged particles in solar flares	National astronomy meeting (NAM2012), Manchester, UK	March 2012
1	Talk	Hussein, M.	New method of calculating star masses using spectroscopy	Azarquiel workshop in astronomy, 2011, Beirut, Lebanon	June 2011

### Public outreach activities

guide	astronomy open house	<u>public open houses at the Ewen observatory and the Lockhart planetarium hosted jointly by the Department of Physics and Astronomy at the University of Manitoba and Royal Astronomical Society of Canada-RASC</u>			every first Thursday of every month since Sept. 2014
speaker	astronomy open house what's new? presentation	presenting what's new in the astrophysical community to a public audience in the Lockhart planetarium			Sept. 2016 Jan. 2016 Oct. 2015
co-host	<u>University of Manitoba info days</u>	introducing Physics and Astronomy programs at the University of Manitoba to high school students			Feb. 2015 & Feb. 2014
guest speaker	main talk presentation (invited)	<u>monthly meeting of the Royal Astronomical society of Canada-RASC (Winnipeg chapter)</u> . Talk title: astrophysical plasmas: from peaceful auroras to outrageous explosions			Feb. 2015
guide	solar observatory	during the orientation week at the University of Manitoba			Sept. 2014
demonstrator	<u>Physics and Astronomy day at The University of Manitoba</u>	running dozens of demonstrations and operating sessions to introduce physics to high school students			Nov. 2013
co-host	JBCA public engagement series	performing experiments on interference and interferometry in the museum of science and industry of Manchester and application on radio astronomy			July 2012
guide	JBCA night-sky club	setting up telescopes every month for the public to explain what's up in the sky			May, June July, August 2012

### Numerical skills

computing	C, C++, Python, R, Bash, Matlab, IDL
operating system	Unix, linux, Mac, Windows (expert in using Excel for undergraduate physics labs)
visualization	Paraview
astronomy packages	CASA