Ari Silburt

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Research Interests

Solar System dynamics, N-body simulations, planetesimal disk physics, planet occurrence, habitability.

Education

PhD Astrophysics, Department of Astronomy & Astrophysics, University of Toronto. Advisor: Prof. Hanno Rein, 2017

BSc Honours Physics, Department of Physics, Mount Allison University. Advisor: Prof. David Hornidge, 2012

Awards and Honours

- NSERC PGS-D Research Grant (2015-2017) – Graduate research award from the National Science and Engineering Research Council of Canada.
- Walter C. Sumner Fellowship (2015-2016) – Graduate research award for academic excellence.
- NSERC CGS-M Research Grant (2013-2014) – Graduate research award from the National Science and Engineering Research Council of Canada.
- Dr. R. N. Varma Memorial Award (2012) – Graduating undergrad physics student with highest GPA.
- Donald G. Macgregor Scholarship (2011) – 3rd year undergrad physics student with highest GPA.
- Matthews Prize (2011) – Highest mark in the course "Electricity & Magnetism".
- NSERC USRA Summer Research Grants (2010-2011) - Undergraduate Summer Research Awards from the National Science and Engineering Research Council of Canada.
- Harrison McCain Scholarship (2008-2012) – Undergrad entrance scholarship for academic excellence.

Teaching and Outreach

Teaching Assistant: Leading Tutorial Lectures and Labs, Marking, Proctoring, 2008-2016

- AST101: The Sun and its Neighbours
- AST201: Stars and Galaxies
- AST251: Life on Other Worlds
- AST210: Great Moments in Astronomy
- PHYS1021: Solar System Astronomy
- PHYS3001: Astrophysics

Planetarium Operator, 2012-2016

Scientific Consultant to Bill Gastle on novel *Mission 32*, 2015-2016

AstroTours Keynote Lecture Head Organizer, 2016

Graduate Astronomy Student Association (GASA) Vice President, 2014-2016

Telescope Operator, 2009-2014

Astronomy Society Executive, 2011-2012

Research Experience

Graduate Student, University of Toronto, Advisor: Prof. Hanno Rein, 2014-2017

- Investigating solar systems with planetesimal disks using N-body integrators. Specifically trying to determine the required planetesimal disk mass to shake planets out of mean motion resonance (MMR).
- Developed HERMES, a Hybrid integrator for simulating N-body systems that have close encounters and/or collisions. Built off of two existing integrators WHFAST and IAS15, HERMES is fully incorporated into REBOUND, a powerful simulation package capable of investigating any numerical problem in solar-system physics.

- Determined whether planet-star tidal interactions are sufficient to explain the abundance of planet pairs just wide of 2:1 MMR. Using N-body simulations, each Kepler system with a near-MMR pair was placed into resonance and subject to tidal forces for 10 billion years.

Graduate Student, University of Toronto, Advisors: Prof. Eric Gaidos, Prof. Yanqin Wu, 2013-2015

- Calculated the occurrence of planets around solar-type stars using the Kepler data. Primary motivation was to incorporate the large errors in radius into the analysis of the Kepler size distribution, and more accurately constrain the occurrence of habitable planets.

Graduate Student, University of Toronto, Advisors: Prof. Ray Jayawardhana, Dr. Ernst de Mooij, 2012-2013

- Conducted research on the disintegrating exoplanet, KIC-12557548b. Using two nights of data collected from Gemini North Telescope, the planet's size, tail length, and average ejected particle size was extracted.

Undergraduate Student, Mount Allison University, Advisor: Prof. David Hornidge, 2010-2012

- Investigated the 'spin polarizabilities' of the proton, a fundamental constant, at the MAinzer MIcrotron (MAMI) in Mainz, Germany. Main focus was to investigate the differential and total cross sections of the proton, which can be described as probability distributions of outgoing photons after interacting via Compton Scattering from protons at a reaction site.

Refereed Publications

Silburt, A., and Rein, H., 2015, *Tides Alone Cannot Explain Planets Close to 2:1 MMR*, MNRAS, 453, 4, 4089-4096

Silburt, A., Gaidos, E. and Wu, Y., 2015, *A Statistical Reconstruction of the Planet Population around Kepler Solar-type Stars*, ApJ, 79, 2.

Talks, Posters and Conferences

Silburt, A. (Talk, 2015) – *A Conversation with an Old Friend, the Moon*. University of Toronto Astronomy Public Tours, Toronto, ON, Canada.

Silburt, A. (Poster, 2015) – *Tidal Forces Cannot Explain Planets Close to 2:1 Mean Motion Resonance*. Extreme Solar Systems III (ESS-III), Waikoloa Beach, HI, USA.

Silburt, A. (Talk, 2015) – *Sifting Through the Noise: A Re-calculation of the Occurrence of Earth-Sized Planets around Kepler Stars*. Emerging Researchers in Exoplanet Science Symposium (ERESS), University Park, PA, USA.

Silburt, A. (Talk, 2015) – *Interstellar: The Science Behind the Movie.* University of Toronto Astronomy Public Tours, Toronto, ON, Canada.

Gaidos, E., Silburt, A., Wu, Y. (Talk, 2014) - *Occurrence Doesn't Just Happen: Revisiting the Frequency of Earth-Size Planets around Kepler Stars*. Towards Other Earths II: The Star-Planet Connection, Porto, Portugal. *Talk given by Eric Gaidos on my behalf.

Silburt, A. (Talk, 2014) – *"Extracting the Radius Distribution using noisy Kepler Data"*. CITA Blackboard Talk, University of Toronto, Toronto, ON, Canada

Silburt, A. (Talk, 2013) – *Distant Earths*. University of Toronto Astronomy Public Tours, Toronto, ON, Canada.

Silburt, A. (Talk, 2012) – *Improving the Beam Asymmetries for Compton Scattering from the 2008 Data*. Atlantic Undergraduate Physics and Astronomy Conference (AUPAC), Halifax, NS, Canada.

Silburt, A. (Talk, 2011) – *Extracting the Cross Sections and Beam Asymmetries from the 08 Data*. Institut für Kernphysik, Universität Mainz, Mainz, Germany.

Silburt, A. (Talk, 2011) – *Improving the Beam Asymmetries of the Proton*. Mount Allison Summer Undergraduate Research Fair (SURF), Sackville, NB, Canada.

Silburt, A. (Poster, 2010) – *Extracting the Spin Polarizabilities of the Proton Via Compton Scattering*. Canadian Undergraduate Physics Conference (CUPC), Halifax, NS, Canada.

Contributed Code

HERMES (2016) – A hybrid, N-body integrator capable of resolving close encounters and collisions between planetary bodies. I am the primary developer of HERMES, which will soon be incorporated into the larger framework of REBOUND.