Evan Alexander Tyler

Ph.D. Candidate
University of Minnesota, Twin Cities

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Education:

Ph. D. Astrophysics — University of Minnesota, Twin Cities — Expected date: 2019
Dissertation: TBA
Adviser: Dr. Cynthia Cattell

M.Sc. Astroparticle Physics — Jacobs University, Bremen, Germany — 2012
Thesis: The Discrepancy between Single and Multi-spacecraft Methods for determining the Orientation of Discontinuities in the Solar Wind
Adviser: Dr. Joachim Vogt

B. Sc. Physics — New Mexico Tech, Socorro — 2010

Publications:

Tyler et. al. (2016), *Partitioning of integrated energy fluxes in four tail reconnection events observed by Cluster*, J. Geophys. Res., 121, doi:10.1002/2016JA023330

Abstract: We present the partitioning of integrated energy flux from four tail reconnection events observed by Cluster, focusing on the relative contributions of Poynting flux, electron, H+ and O+ enthalpy, and kinetic energy flux in the tailward and earthward directions in order to study temporal and spatial features of each event. We further subdivide the Poynting flux into three frequency bands to examine the possible structures and waves that contribute most significantly to the total Poynting flux from the reconnection region. Our results indicate that H+ enthalpy flux is often dominant, but O+ enthalpy, electron enthalpy, Poynting flux, and H+ kinetic energy flux can contribute significant or greater total energy flux depending on spacecraft location with respect the current sheet, flow direction, temporal scale, and local conditions. We observe integrated H+ enthalpy fluxes that differ by factors of 3–4 between satellites, even over ion inertial length scales. We observe strong differences in behavior between H+ and O+ enthalpy fluxes in all events, highlighting the importance of species-specific energization mechanisms. We find tailward-earthward asymmetry in H+ enthalpy flux, possibly indicative of the influence of the closed earthward boundary of the magnetotail system. Frequency filtering of the Poynting flux shows that current sheet surface waves and structures on the timescale of current sheet flapping contribute significantly, while large-scale structure contributions are relatively small. We observe that the direction and behavior of the Poynting flux differs between bands, indicating that the observed flux originates from multiple distinct sources or processes.

Research Experience:

University of Minnesota, Minneapolis, MN
June 2014 - present
I Investigate the partitioning of energy outflows from reconnection events in the magnetotail using Cluster satellite data. I also study signatures of electron trapping within high-amplitude whistler wave events observed by the Van Allen Space Probe mission.

Jacobs University, Bremen, Germany
August 2010-June 2012
I used Cluster satellite data to quantify the discrepancies between triangulation and Minimum Variance Analysis for determining discontinuity normals in the solar wind.

Laboratory for Atmospheric and Space Physics, Boulder, CO
June 2009-August 2009 (Summer REU)
I wrote an automated IDL program to identify solar features based on SOHO Satellite EUV image histograms and calculated the percent area of the sun covered by each feature.

Langmuir Lab, Socorro, NM
September 2007 – May 2009
Tracked Pacific storms, created and maintained an automated website for data display, manipulated and analyzed data, hypothesized behavior of future storms.

Teaching and Outreach Experience:

MIfA Outreach Coordinator – University of Minnesota, Minneapolis, MN
January 2016 – present
Duties: Interfaces with the public to plan, staff, and provide Physics and Astronomy outreach activities to interested groups. Responsible for the creation and maintenance of a website for listing and scheduling events.

Astronomy 1001 Head TA – University of Minnesota, Minneapolis, MN
August 2015 – December 2015
Duties: Oversaw the organization, staffing, training, and management of the AST 1001 labs, facilitated weekly meetings with TA's, improved laboratory materials and literature, performed normal TA duties for one lab section.

Astronomy 1001 Lab TA -- University of Minnesota, Minneapolis, MN
September 2014 – May 2015
Duties: Prepared short lectures and quizzes to support the lab exercises, guided students through lab procedures, offered constructive feedback, and graded lab reports.

Mathematics Instructor – Centura College, Newport News, VA
March 2013 - May 2014
Duties: Principle instructor for 5-week courses in mathematics for non-traditional college students. Designed lesson plans and collaborated with other professors in creating a standardized lesson plan, provided tutoring services, created and graded assignments and tests.

Private Tutor – Self Employed, Newport News, VA
July 2012 - May 2014
Duties: Privately conducted lessons on physics, chemistry, advanced mathematics, and study strategies.

General Physics Teaching Assistant – Jacobs University, Bremen, Germany
September 2011 - May 2012
Duties: Offered weekly tutorials to the students on relevant topics in General Physics, Electricity and Magnetism, and Optics. Graded homework assignments and tests.

Natural Science Lab Teaching Assistant – Jacobs University, Bremen, Germany
September 2010 - May 2012
Duties: Administered oral quizzes to students, discussed physical concepts relevant to the experiments, and assessed student comprehension of the material. Graded lab reports and provided helpful feedback for the students.

Homework Grader for Modern Physics 1 & 2 – New Mexico Tech, Socorro, NM
August 2007- May 2008
Duties: Graded assignments from Modern Physics 1 & 2 and provided feedback for the students.

Achievements/Awards:

- Best Outreach Award, University of Minnesota (Spring 2015)
- Best Teaching Assistant Award, University of Minnesota (Fall 2015)
- Certificate of Completion: Preparing Future Faculty Program, University of Minnesota (2015)

Additional Projects:

- Co-founder, *Queer Science Day*: a program for trans/queer youth to explore STEM field research (program operating Fall 2016 - present)
- Co-author and contributor, *Narrating the Origin of the Universe through Music: A Case Study*, Maria Mannone, Kyriaki Gkoudina, and Evan Tyler (accepted for publication in *Zbornik radova Akademije umetnosti/Collective papers of Academy of Arts*)
- Committee member, Physics and Astronomy Climate and Diversity Committee (Fall 2016-present)

References:

Dr. Cynthia Cattell (Adviser)
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Dr. Lawrence Rudnick
Professor – Minnesota Institute for Astrophysics
Phone: 624-3396
Email: larry@astro.umn.edu