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STEPHEN PORTILLO

EMPLOYMENT

ASSISTANT PROFESSOR (PHYSICS), CONCORDIA UNIVERSITY OF EDMONTON

2022 - present

DIRAC POSTDOCTORAL FELLOW,
UW DATA SCIENCE POSTDOCTORAL FELLOW, UNIVERSITY OF WASHINGTON

2018 - 2022

EDUCATION

PhD ASTRONOMY AND ASTROPHYSICS, HARVARD UNIVERSITY

2012 - 2018

Secondary Field in Computational Science and Engineering

Thesis: Counting Stars: Developing probabilistic cataloging for crowded fields

Adviser: Douglas Finkbeiner

BSc HONORS ASTROPHYSICS, UNIVERSITY OF ALBERTA

2008 - 2012

with First Class Honors

PUBLICATIONS

THE DECAM ECLIPTIC EXPLORATION PROJECT (DEEP) VI: FIRST MULTI-YEAR OBSERVATIONS OF TRANS-NEPTUNIAN OBJECTS

H. Smotherman, P.H. Bernardinelli, S.K.N. Portillo, A.J. Connolly, J.B. Kalmbach, S. Stetzler, M. Jurić, D. Bektešević, Z. Langford, F.C. Adams, W.J. Oldroyd, M.J. Holman, and 16 co-authors, *accepted to the Astronomical Journal*.

THE DECAM ECLIPTIC EXPLORATION PROJECT (DEEP) V: THE ABSOLUTE MAGNITUDE DISTRIBUTION OF THE COLD CLASSICAL KUIPER BELT

K.J. Napier, 22 co-authors including S.K.N. Portillo, and the DEEP Collaboration, *accepted to the Planetary Science Journal*.

THE DECAM ECLIPTIC EXPLORATION PROJECT (DEEP) III: SURVEY CHARACTERIZATION AND SIMULATION METHODS

P.H. Bernardinelli, H. Smotherman, Z. Langford, S.K.N. Portillo, A.J. Connolly, J.B. Kalmbach, S. Stetzler, M. Jurić, W.J. Oldroyd, H.W. Lin, and 17 co-authors, *accepted to the Astronomical Journal*.

PCAT-DE: RECONSTRUCTING POINT-LIKE AND DIFFUSE SIGNALS IN ASTRONOMICAL IMAGES USING SPATIAL AND SPECTRAL INFORMATION

R.M. Feder, V. L. Butler, T. Daylan, S.K.N. Portillo, J. Sayers, B.J. Vaughan, C. V. Zamora, M. Zemcov, *The Astronomical Journal* **166** 98 (2023).

SARABANDE: 3/4 POINT CORRELATION FUNCTIONS WITH FAST FOURIER TRANSFORMS

J. Sunseri, Z. Slepian, S.K.N. Portillo, J. Hou, S. Kahraman, D.P. Finkbeiner, *Royal Astronomical Society Techniques and Instruments* **2** 62 (2023).

MEASUREMENT OF THE RELATIVISTIC SUNYAEV-ZELDOVICH CORRECTION IN RX J1347.5-1145

V.L. Butler, R.M. Feder, T. Daylan, A.B. Mantz, D. Mercado, A. Montaña, S.K.N. Portillo, J. Sayers, B.J. Vaughan, M. Zemcov, A. Zitrin, *The Astrophysical Journal* **932** 1 (2022).

21CMVAE: A VERY ACCURATE EMULATOR OF THE 21-CM GLOBAL SIGNAL

C.H. Bye, S.K.N. Portillo, A. Fialkov, *The Astrophysical Journal* **930** 79 (2022).

SIFTING THROUGH THE NOISE: MOVING OBJECT DETECTION IN DIFFERENCED IMAGES

H. Smotherman, A.J. Connolly, J.B. Kalmbach, S.K.N. Portillo, D. Bektešević, S. Eggl, M. Jurić, J. Moeyens, P.J. Whidden, *The Astronomical Journal* **162** 245 (2021).

CLASSIFICATION OF MAGNETOHYDRODYNAMIC SIMULATIONS USING WAVELET SCATTERING TRANSFORMS

A.K. Saydjari, S.K.N. Portillo, Z. Slepian, S. Kahraman, B. Burkhart, D. Finkbeiner, *The Astrophysical Journal* **910** 122 (2021).

THE CATALOGUE FOR ASTROPHYSICAL TURBULENCE SIMULATIONS

B. Burkhart and 20 co-authors, including S.K.N. Portillo, *The Astrophysical Journal* **905** 14 (2020).

DIMENSIONALITY REDUCTION OF SDSS SPECTRA WITH VARIATIONAL AUTOENCODERS

S.K.N. Portillo, J.K. Parejko, J.R. Vergara, A. Connolly, *The Astronomical Journal* **160** 45 (2020).

TOWARD SAMPLING FOR DEEP LEARNING MODEL DIAGNOSIS

P. Mehta, S.K.N. Portillo, M. Balazinska, A. Connolly, *IEEE 36th International Conference on Data Engineering* [poster paper] (2020).

PHOTOMETRIC BIASES IN MODERN SURVEYS

S.K.N. Portillo*, J.S. Speagle*, D.P. Finkbeiner, *The Astronomical Journal* **159** 165 (2020).
*equal contributions

MULTIBAND PROBABILISTIC CATALOGING: A JOINT FITTING APPROACH TO POINT SOURCE DETECTION AND DEBLENDING

R.M. Feder, S.K.N. Portillo, T. Daylan, D.P. Finkbeiner, *The Astronomical Journal* **159** 163 (2020).

MAPPING DISTANCES ACROSS THE PERSEUS MOLECULAR CLOUD USING CO OBSERVATIONS, STELLAR PHOTOMETRY, AND GAIA DR2 PARALLAX MEASUREMENTS

C. Zucker, E.F. Schlafly, G.M. Green, J.S. Speagle, S.K.N. Portillo, D.P. Finkbeiner, A. A. Goodman, *The Astronomical Journal* **869** 83 (2018).

DEVELOPING THE 3-POINT CORRELATION FUNCTION FOR THE TURBULENT INTERSTELLAR MEDIUM

S.K.N. Portillo, Z. Slepian, B. Burkhart, S. Kahraman, D.P. Finkbeiner, *The Astrophysical Journal* **862** 119 (2018).

TOO HOT TO HANDLE? ANALYTIC SOLUTIONS FOR MASSIVE NEUTRINO OR WARM DARK MATTER COSMOLOGIES

Z. Slepian and S.K.N. Portillo, *The Monthly Notices of the Royal Astronomical Society* **478** 516 (2018).

IMPROVED POINT SOURCE DETECTION IN CROWDED FIELDS USING PROBABILISTIC CATALOGS

S.K.N. Portillo, B.C.G. Lee, T. Daylan, D.P. Finkbeiner, *The Astronomical Journal* **154** 132 (2017).

INFERENCE OF UNRESOLVED POINT SOURCES AT HIGH GALACTIC LATITUDES USING PROBABILISTIC CATALOGS

T. Daylan, S.K.N. Portillo, D.P. Finkbeiner, *The Astrophysical Journal* **839** 4 (2017).

A THEORETICAL FRAMEWORK TO PREDICT THE MOST LIKELY HADRON PATH IN PARTICLE IMAGING

C.-A. Collins-Fekete, L. Volz, S.K.N. Portillo, L. Beaulieu, J. Seco, *Physics in Medicine and Biology* **62** 1777 (2017).

A MAXIMUM LIKELIHOOD METHOD FOR HIGH RESOLUTION PROTON RADIOGRAPHY/PROTON CT

C.-A. Collins-Fekete, S. Brousmiche, S.K.N. Portillo, L. Beaulieu, J. Seco, *Physics in Medicine and Biology* **61** 8232 (2016).

THE CHARACTERIZATION OF THE GAMMA-RAY SIGNAL FROM THE CENTRAL MILKY WAY: A CASE FOR ANNIHILIATING DARK MATTER

T. Daylan, D.P. Finkbeiner, D. Hooper, T. Linden, S.K.N. Portillo, N.L. Rodd, T.R. Slatyer, *Physics of the Dark Universe* **12** 1 (2016).

SHARPER FERMI LAT IMAGES: INSTRUMENT RESPONSE FUNCTIONS FOR AN IMPROVED EVENT SELECTION

S.K.N. Portillo and D.P. Finkbeiner, *The Astrophysical Journal* **796** 54 (2014).

NANOMECHANICAL TORSIONAL RESONATOR TORQUE MAGNETOMETRY

J.P. Davis, D. Vick, P. Li, S.K.N. Portillo, A.E. Fraser, J.A.J. Burgess, D.C. Fortin, W.K. Hiebert, M.R. Freeman, *Journal of Applied Physics* **109** 07D309 (2011).

GRANTS

2023 NSERC DISCOVERY GRANT & DISCOVERY LAUNCH SUPPLEMENT (PI)

"Probabilistic Cataloguing for Binary Kuiper Belt Objects and Crowded Fields" (99 700 CA$)

2022 UW DATA SCIENCE POSTDOCTORAL FELLOWS RESEARCH FUNDING

(3 000 US$)

2021 LSSTC ENABLING SCIENCE (PI)

"Simulating the Impact of Blending on Crowded Field Photometry" (2 600 US$)

INVITED PRESENTATIONS

Astrostatistics in Canada and Beyond, Banff International Research Centre, November 2023

Colloquium, Department of Astronomy & Astrophysics, University of Toronto, September 2023

Statistical Sciences Applied Research and Education Seminar, Canadian Statistical Sciences Institute Ontario, September 2023

Astrophysics Group Seminar, Department of Physics, University of Alberta, August 2023

ASA/IMS Spring Research Conference, Banff Centre, May 2023

Seminar, Department of Statistical Sciences, University of Toronto, March 2022

Colloquium, Department of Astronomy, University of Florida, March 2021

Machine Learning Tools for Research in Astronomy, Schloss Ringberg, December 2019

Colloquium, Department of Astronomy, University of Florida, November 2019

ZTF Collaboration Meeting, University of Washington, September 2019

Astronomy Group Colloquium, Department of Physics & Astronomy, University of British Columbia, January 2019

Friday Seminar, Kavli Institute for Cosmological Physics, University of Chicago, December 2018

Colloquium, Department of Astronomy, University of Washington, October 2018

Classification in the Golden Era of X-ray Catalogs Workshop, Center for Astrophysics | Harvard & Smithsonian, May 2018

TEACHING

INSTRUCTOR, PHY 121: INTRODUCTORY GENERAL PHYSICS I (CONCORDIA U. EDMONTON)

Fall 2022, Fall 2023

INSTRUCTOR, PHY 122: INTRODUCTORY GENERAL PHYSICS II (CONCORDIA U. EDMONTON)

Winter 2023

INSTRUCTOR, MAT 114: ELEMENTARY CALCULUS I (CONCORDIA U. EDMONTON)

Winter 2023

INSTRUCTOR, PHY 111: INTRODUCTION TO UNIVERSITY PHYSICS I (CONCORDIA U. EDMONTON)

Fall 2022

CO-INSTRUCTOR, ASTR 598: MACHINE LEARNING IN ASTRONOMY (U. WASHINGTON)

Winter 2022

CO-INSTRUCTOR, ASTR 324: INTRODUCTION TO STATISTICS AND MACHINE LEARNING IN ASTRONOMY (U. WASHINGTON)

Spring 2021

TEACHING ASSISTANT, ASTRON 16: STELLAR AND PLANETARY ASTRONOMY (HARVARD U.)

Spring 2018

TEACHING ASSISTANT, ASTRON 130: COSMOLOGY (HARVARD U.)

Spring 2014, Spring 2016

TEACHING ASSISTANT, SPU 19: THE ENERGETIC UNIVERSE (HARVARD U.)

Spring 2015

TEACHING ASSISTANT, SPU 21: STELLAR UNDERSTANDING OF THE COSMOS (HARVARD U.)

Fall 2013

TEACHING ASSISTANT (COMPUTING SCIENCE), SCI 100: INTEGRATED SCIENCE (U. ALBERTA)

2009/2010, 2010/2011, 2011/2012

SERVICE

REFEREE

Astronomical Journal, Astrophysical Journal Letters, Astronomy and Computing, Annals of Applied Statistics, Royal Astronomical Society Techniques and Instruments

ASTROHACKWEEK

Lecturer (2020)

UNIVERSITY OF WASHINGTON

Data Science Reading Group Coordinator (2019-2022)

DIRAC Visitors' Committee Chair (2019-2022)

Mentor, Pre-Major in Astronomy Program (2019, 2021)

CAMBRIDGE SCIENCE FESTIVAL

Cambridge Explores the Universe Volunteer (2015)

Einstein in the Classroom Instructor (2015)

SCIENCE IN THE NEWS BOSTON

Webmaster (2012 to 2017)

Spring Lecture Series Co-Coordinator (2016)

Lecturer (2013, 2014)

Outreach Committee (2012-2013)

UNIVERSITY OF ALBERTA INTERDEPARTMENTAL SCIENCE STUDENTS' SOCIETY

Director of Finance, Co-Director of Locker Rentals (2011/2012)

Year III Councillor (2010/2011)

EDMONTON REGIONAL SCIENCE FAIR COUNCIL

Judging Committee, Webmaster, Secretary (2009-2012)

Canada-Wide Science Fair Ambassador (2012)

TELUS WORLD OF SCIENCE EDMONTON

Assistant Observatory Attendant (2006-2012)

Assistant Camp Leader (2006, 2008)

MENTORSHIP

Benjamin Herrera (2021-2022, UW undergrad, Pre-Major in Astronomy)

Christian Bye (2020-2022, McGill undergrad → U.C. Berkeley grad student)

Scott Kentala (2020-2022, UW undergrad)

Kole Allison (2020-2021, UW undergrad)

Catalina Zamora (2019-2022, UW undergrad, Pre-Major in Astronomy)

Hielen Enyew (2019, UW undergrad, Pre-Major in Astronomy)

Richard Feder (2017-, Harvard U. undergrad → Caltech grad student)

Benjamin Lee (2015-2017, Harvard U. undergrad)

Sule Kahraman (2015, high school student, MIT Research Science Institute)

SELECTED HONOURS

NSERC Postdoctoral Fellowship, 2018 (*declined*)

Sir James Lougheed Award of Distinction – Doctoral, 2017

NSERC Postgraduate Scholarship – Doctoral, 2015

Certificates of Distinction in Teaching, 2013, 2016, 2018

NSERC Postgraduate Scholarship – Master's, 2012 (*converted from an Alexander Graham Bell Canada Graduate Scholarship – Master's*)

Dean's Silver Medal in Science, 2012

Students' Union Centenary Award for Academic Excellence, 2012

Undergraduate Student Teaching Award, 2011

NSERC Undergraduate Student Research Awards, 2009, 2010, 2011

Institute of Particle Physics CERN Summer Student, 2011

Louise McKinney Post-Secondary Scholarships, 2009, 2010, 2011