Paul James Wright

CONTACT INFORMATION

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Publication List: SAO/NASA ADS

RESEARCH SUMMARY

My research interests range from solar to stellar physics, with the majority of my research concentrating on the heating of the solar corona. I have expertise in the analysis of spectroscopic and narrowband Extreme Ultra-Violet (EUV) and X-ray data from the *Solar Dynamics Observatory* and *Hinode*, in addition to the hard X-ray (HXR) observations from *NuSTAR*'s heliophysics campaign. I am currently using a hydrodynamics code (Enthalpy-Based Thermal Evolution of Loops, EBTEL) to model light curves from coronal loops. In particular I am interested in the weak bremsstrahlung emission, with a view to understanding the requirements for future X-ray instrumentation to study the coronal heating problem.

EDUCATION

University of Glasgow, Glasgow, UK — 2014 – May 2018
Ph.D. Solar Physics
Thesis Topic: *The Energetics of Small Flares and Brightenings*
Advisers: Dr Iain G. Hannah, Dr Alexander MacKinnon

University of Southampton, Southampton, UK — 2010 – 2014
MPhys Astrophysics with a year abroad
First-class honours (1:1)
Adviser: Professor Malcolm Coe

Harvard University/Harvard-Smithsonian CfA, Cambridge, MA, USA — 2013 – 2014
MPhys Astrophysics with a year abroad
Thesis Topic: *Superflare Rates of Solar-Like Stars*
Advisers: Dr Steven H. Saar, Dr Jeremy J. Drake

CURRENT ACADEMIC APPOINTMENT

Affiliate Staff Member, University of Glasgow — 2017 – present
SUPA School of Physics and Astronomy

- Using the EBTEL hydrodynamics code to model light curves from coronal loops. The parameter space of these simulations will be constrained by observations obtained during the *NuSTAR* heliophysics campaign, and these simulations will used to test a variety of analysis techniques.

PREVIOUS ACADEMIC APPOINTMENTS

Post-Graduate Research Assistant, University of Glasgow — 2014 – 2017
SUPA School of Physics and Astronomy
Project: *The Energetics of Small Flares and Brightenings*

- Analysed observations of the Sun with *NuSTAR*, a telescope not designed for heliophysics. These observations are the most sensitive of their kind and have resulted in numerous, wide-ranging, highly-collaborative peer-reviewed publications.
- Analysed non-flaring coronal time-series in pursuit of signatures of the coronal heating mechanism. Techniques included time-lag analysis (cross-correlation), Fourier analysis, wavelet analysis, and local intermittency measure (LIM).
- Studied the temperature distribution of the solar atmosphere through the recovery of an ill-posed inverse problem (the differential emission measure, DEM) using techniques such as Tikhonov regularisation, Markov-chain Monte Carlo, and sparsity.
- The press-release image produced from the *NuSTAR* observations obtained for Wright *et al.* 2017 was published by numerous news outlets, and is one of the five iconic images from *NuSTAR*'s first five years in space.

Collaborators: *Dr Iain Hannah, Dr Alexander MacKinnon*

PREVIOUS ACADEMIC APPOINTMENTS (CONT.)

Visiting Researcher, NASA Goddard Space Flight Center (GSFC) 2016
Heliophysics Science Division
- Explored the possibility of implementing DEM maps in the Helioviewer project, and their usefulness as an input for various established analysis techniques.

Collaborators: *Dr Nicholeen Viall, Dr Jack Ireland*

Research Scholar, Harvard-Smithsonian Center for Astrophysics (CfA) 2013 – 2014
Solar and Stellar X-Ray Group
- Designed and implemented a sophisticated stellar flare detection routine for long-cadence (30 mins) *Kepler* data obtained from a proprietary set of spectroscopically verified solar-type stars in three open clusters.
- A preliminary version of this work had coverage by Science, and The Smithsonian Magazine.

Collaborators: *Dr Steven Saar, Dr Søren Meibom, Dr Jeremy Drake, Dr Vinay Kashyap*

Summer Research Intern, University of Southampton 2013
Astronomy Group
- Investigated the presence of double blue straggler sequences in globular clusters using Hubble Space Telescope (ACS, WFPC2) data.

Collaborators: *Dr Andrea Dieball*

REFEREED JOURNAL PUBLICATIONS

[1] Marsh, A. J., Smith, D. M., Glesener, L. *et al* 2017. *First NuSTAR Limits on Quiet Sun Hard X-Ray Transient Events*, ApJ, 849, 131

[2] Wang, J., Simões, P. J. A., Jeffrey, N. L. S. *et al* 2017. *Observations of Reconnection Flows in a Flare on The Solar Disk*, ApJL, 847, L1

[3] **Wright, P. J.**, Hannah, I. G., Grefenstette, B. W., *et al* 2017. *Microflare Heating of a Solar Active Region Observed with NuSTAR, Hinode/XRT, and SDO/AIA*, ApJ, 844, 132

[4] Kuhar, M., Krucker, S., Hannah, I. G., *et al* 2017. *Evidence of Significant Energy Input in the Late Phase of a Solar Flare from NuSTAR X-ray Observations*, ApJ, 835, 6

FIRST AUTHOR PUBLICATIONS IN PREPARATION

[5] **Wright, P. J.**, Hannah, I. G., Viall, N. M., *et al*

[6] **Wright, P. J.**, Saar, S. H., Meibom, S., *et al*

CONFERENCES, WORKSHOPS, & SCHOOLS

Invited Oral Presentations

ISSI Team Meeting: Coronal Nanoflares, Bern, CH 2016
Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA 2014

Oral/ePoster Presentations

Solar Physics Division Meeting (SPD/AAS), Portland, OR, USA 2017
Coronal Loops Workshop VIII, Palermo, Sicily, IT 2017
Living with a Star (SDO/LWS) Workshop, Burlington, VT, USA 2016
Hinode 10, Nagoya, JP 2016
National Astronomy Meeting 2016, Nottingham, UK 2016
Hinode 9, Belfast, UK 2015
Glasgow-Cambridge Flare Workshop, Glasgow, UK 2015

Poster Presentations

European Solar Physics Meeting (ESPM), Budapest, HU 2017
Solar Physics Division Meeting (SPD/AAS), Portland, OR, USA 2017
Living with a Star (SDO/LWS) Workshop, Burlington, VT, USA 2016
Coronal Loops Workshop VII, Cambridge, UK 2015
National Astronomy Meeting (NAM) 2015, Llandudno, UK 2015
223rd AAS Meeting, National Harbor, MD, USA 2014

CONFERENCES, WORKSHOPS, & SCHOOLS (CONT.)

Schools Attended

CESRA Radio Summer School 2015, Glasgow, UK 2015
STFC Advanced Summer School in Solar Physics, Dundee, UK 2014

Conferences/Workshops Attended

NuSTAR Heliophysics Workshop (remote participation), Berkeley, CA, USA 2017
SUPA Cormack Astronomy Meeting, Edinburgh, UK 2015
Royal Astronomical Society Discussion Meeting: Results from IRIS, London, UK 2015
SUPA Cormack Astronomy Meeting, Edinburgh, UK 2014
1st Space Glasgow Research Conference, Glasgow, UK 2014

AWARDS AND GRANTS TOTAL: £7000

University of Glasgow

Solar Physics Division Meeting (SPD/AAS) Student Poster Award 2017
Solar Physics Division Meeting (SPD/AAS) Studentship Award 2017
Coronal Loops Workshop VIII Travel Award 2017
National Astronomical Observatory of Japan Travel Award 2016
Hinode 9 Travel Award 2015
European Space Agency/Cambridge Philosophical Society Travel Award 2015

University of Southampton

Research Scholarship 2013
Summer Studentship Grant 2013

TEACHING

Coursera Inc.

"Data Scientists Toolbox" Community Mentor 2017 – present
An invited mentor of a course in the Data Science specialisation offered by Johns Hopkins University.

University of Glasgow

Astronomy 1 Tutorial Demonstrator 2016 - 2017
Supervised students, and marked first-year astronomy problem sets.

Astronomy 3/4 (Honours) Laboratory Demonstrator 2015 - 2016
Demonstrated, supervised, and marked a number of final-year research projects covering topics such as asteroid light curves, and solar limb darkening.

Physics Pre-University Summer School 2015
Taught at a pre-university school for students entering first year.

MEMBERSHIPS

***NuSTAR* Heliophysics Working Group**, Member 2015 – present
International Space Science Institute (ISSI), Young Scientist Member 2015 – present
Member of Paola Testa's ISSI Team: *New Diagnostics of Particle Acceleration in Solar Coronal Nanoflares from Chromospheric Observations and Modelling*
Royal Astronomical Society, RAS Fellow 2014 – present

COMMUNITY INVOLVEMENT

Nature Communications, Reviewer 2017 – present
Glasgow Astronomy & Astrophysics Group Meeting, Organiser 2017
CESRA Radio Summer School, Volunteer Organiser 2015

SCIENTIFIC OUTREACH

Glasgow Science Centre, Demonstrator 2016
British Science Week, Demonstrator 2016
Institute of Physics: *Women and Girls in Science*, Demonstrator 2016
Scottish Television (STV), Guest Presenter 2015
World Wide Telescope, Ambassador 2013 – 2014

SCIENTIFIC OUTREACH (CONT.)

BBC Stargazing Live, Demonstrator 2013
So'ton Astrodome, Demonstrator 2012
BBC Bang Goes The Theory Roadshow, Demonstrator 2012

UK Solar Physics (UKSP) Nuggets, concise, easy-to-read science articles
84. The first *NuSTAR* microflare 2017

Hinode/XRT Picture of the Week (XPOW)
The First Microflare Observations with *Hinode*/XRT & *NuSTAR* 2017

PERSONAL PROJECTS

ColourBlind, A repository for colour-blind-friendly colour tables.

PROFESSIONAL DEVELOPMENT

Coursera, Inc. (MOOC Platform)
Using Coursera.org, a massive open online course (MOOC) platform, to take specialisation (a series of related courses and a final capstone project) offered by accredited universities to further develop skills and understanding in a wide range of computer science topics.

Data Science, Johns Hopkins University 2017 – present
Nine-course (plus capstone) introduction to data science.
Mastering Software Development in R, Johns Hopkins University 2017 – present
Four-course (plus capstone) specialisation providing riguourous training in R.
Statistics with R, Duke University 2017 – present
Four-course (plus capstone) specialisation providing further training in R, with emphasis on statistics.

TECHNICAL SKILLS:

Computing: IDL, Python, R, Bash, LaTeX, IRAF, git, GitHub, Microsoft Office, Adobe Creative Cloud, Linux/Unix, Mac OSX, Microsoft Windows,

General: Data Analysis, Data Visualisation, Interdisciplinary Collaboration, Public Speaking, Statistics, Teaching, Writing (Technical & Lay)