

Curriculum Vitae

David B. Jess

PERSONAL DETAILS

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| Name: | Dr. David B. Jess | Tel: | +44 28 9097 3045 |
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| | Queen's University Belfast | URL: | http://star.pst.qub.ac.uk/~dbj |
| | Belfast, BT7 1NN | DOB: | 15 July 1982 |
| | United Kingdom | Nationality: | British |

EMPLOYMENT

July 2013 – present: STFC Ernest Rutherford Fellow, Queen's University Belfast.
Oct. 2012 – June 2013: Marie Curie Pegasus Fellow, K. U. Leuven, Belgium.
Oct. 2009 – Sept. 2012: STFC Post-doctoral Fellow, Queen's University Belfast.
Oct. 2008 – Sept. 2009: ROSA Instrument Scientist, Queen's University Belfast.

EDUCATION

Oct. 2005 – Oct. 2008 Ph.D. in Solar Physics,
Queen's University Belfast / NASA Goddard Space Flight Center.
Oct. 2001 – July 2005 M.Sci (1ST CLASS HONS) in Physics with Astrophysics,
Queen's University Belfast.

SUMMARY OF RESEARCH OUTPUT

- 40 refereed publications, of which I am first author in 15.
- High citation rates, including:
 1. Jess et al., *Science*, 323, 1582 (2009) — 153 citations.
 2. Verth, Erdélyi & Jess, *ApJ Letters*, 687, L45 (2008) — 48 citations.
 3. Jess et al., *ApJ Letters*, 688, L119 (2008) — 37 citations.
 4. Jess et al., *Sol. Phys.*, 261, 363, (2010) — 35 citations.
- Successful research grant portfolio (totalling £1,547,632 GBP), including:
 1. P.I. of STFC Standard Grant — £339,081 GBP.
 2. P.I. of STFC Ernest Rutherford Fellowship — £507,537 GBP.
 3. P.I. of Pegasus Marie Curie Fellowship — £463,988 GBP.
 4. P.I. of STFC Post-doctoral Fellowship — £222,026 GBP.
 5. P.I. of Royal Society Research Grant — £15,000 GBP.
This funding enabled me to build a dedicated solar imaging instrument, called the Hydrogen-Alpha Rapid Dynamics camera (HARDcam), which has now been successfully commissioned at the National Solar Observatory, USA.
- 17 invited and 10 contributed talks at major national and international conferences.
- Referee for international journals such as *Science*, *ApJ*, *A&A*, and *Physics of Plasmas*.
- Formally appointed supervisor of 3 Queen's University Belfast PhD students, Dr. Peter Keys, Dr. David Kuridze and Mr. Samuel Grant.

PROFESSIONAL MEMBERSHIPS AND SERVICES

- Elected member of the UK Solar Physics Council.
- Fellow of the Royal Astronomical Society (FRAS).
- Associate Member of Institute of Physics (AMInstP).

TEACHING EXPERIENCE

I am dedicated to providing exceptional quality teaching and supervision to my students, as evidenced by my high ratings achieved through class feedback reports. An itemised list of my teaching achievements includes:

- Lecturer of level 3 Professional Skills module, Queen's University Belfast, 2014 – Present.
Teacher Evaluation Questionnaires (TEQs), incorporating my quality of teaching, assessment, and class feedback components averages 4.84 / 5 (97%).
- Lecturer of level 4 Synoptic Physics module, Queen's University Belfast, 2010 – Present.
Teacher Evaluation Questionnaires (TEQs), incorporating my quality of teaching, assessment, and class feedback components averages 4.78 / 5 (96%).
- Member of Queen's University Belfast's Internal and External Examination Boards, 2010 – Present.
- Training and supervision of a Nuffield bursary student, Queen's University Belfast, 2008.
- Physics undergraduate laboratory demonstrator, Queen's University Belfast, 2005 – 2007.

AWARDS AND PRIZES

- ***Andor Insight Award for Captivating Science***, November 2010.
A £1,000 equipment prize awarded by Andor Technology for the best scientific image, among 120+ applicants, which captivated the interest and curiosity of the general public.
- ***Royal Astronomical Society's Keith Runcorn Prize***, December 2009.
Awarded for the best UK PhD thesis in geophysics, solar-terrestrial physics, and planetary sciences.
- ***NASA Group Achievement Award***, June 2009.
Presented by NASA for my contribution to successful development and characterisation of new-generation space-based instrumentation and hardware.
- ***Robert H. Goddard Exceptional Achievement Award for Science***, June 2008.
Awarded by NASA for my contribution to the successful assembly, launch, and scientific exploitation of the *EUNIS* sounding rocket payload.
- ***Raymond Greer Prize***, July 2005.
Awarded to the graduate of Queen's University Belfast with the highest overall degree average.

PUBLIC OUTREACH

- “Solar Explosions: How big? How many? How powerful?”, public lecture given during the NI Science Festival week, February 2015.
- TV interview for BBC Newsnight during Stargazing Live Week, January 2014
- Panel member for 2 Café Scientifique events at the BBC's Stargazing Live event at Cultra Natural History Museum, January 2014

- “The Solar Cauldron: Our Sun as we know it”, public lecture given to the Society for Popular Astronomy, September 2013.
- “What’s in a name? The controversial nature of waves in the Sun’s atmosphere”, web seminar in association with the Jodrell Bank Centre for Astrophysics, attracting over 2500 downloads, May 2012.
- “A Day in the Life of our Sun”, public lecture given to the Irish Astronomical Association, March 2011.
- “Our Solar System”, school talk to P4 and P5 pupils, Victoria Park Primary School, Belfast, UK, May 2010.
- “Twisting Flux Tubes and their role in Magnetic Reconnection”, public lecture given to the Irish Amateur Astronomical Society, August 2008.
- UCAS open days: tours of the School of Mathematics and Physics to A-level students to promote the study of Physics at university.
- Participation and organisation of *Horizons in Physics* open days, where I also took part in a student question and answer seminar.
- I have authored numerous articles in newspapers and magazines (including the Daily Telegraph and National Geographic), and participated in radio and television interviews designed to convey science to the general public (see <http://star.pst.qub.ac.uk/~dbj> for more details).

CONFERENCE ORGANIZATION

- Member of the Local Organising Committee for the Hinode 9 conference, September 2015.
- Member of the Local Organising Committee for the BUKS2012 conference, July 2012.
- Member of the Scientific Organising Committee for the RAS Discussion Meeting “Alfvén Waves: From Predictions to Evidence”, Burlington House, London, UK, January 2010.
- Member of the Local Organising Committee for the STFC Advanced Solar Physics Summer School, September 2008.
- Member of the Local Organising Committee for the National Astronomy Meeting incorporating the UKSP Meeting which attracted over 600 delegates, April 2008.

RESEARCH INTERESTS

- **High-resolution Dynamics of the Solar Atmosphere:**
Multi-wavelength observations of the solar atmosphere acquired using high-resolution ground- and space-based observatories. My work focuses on the propagation mechanism of oscillations and I investigate their energy in order to constrain coronal heating mechanisms. (Refereed publications #1, #3, #4, #6, #7, #8, #9, #10, #13, #14, #15, #16, #17, #18, #19, #20, #23, #26, #28, #29, #32, #34, #39, #40, #41 & #42)
- **Solar Flare Characteristics:**
With the high spatial and temporal resolutions of current solar instruments, I have studied the cause, and subsequent rapid dynamics, of solar flares and microflares. This work provides insight into how sudden magnetic reconnection is triggered, and how the energy is dissipated through the Sun’s atmosphere. (Refereed publications #2, #5, #11, #25, #30 & #36)

- **Solar Feature Detection and Tracking:**

Due to the variability of the solar atmosphere in wavelengths ranging from infrared to X-rays, I have designed algorithms capable of detecting, and tracking, coronal loop structures present in *Transition Region and Coronal Explorer* (TRACE) and *Solar Dynamics Observatory* (SDO) data, in addition to magnetic bright points seen on the surface of the Sun. By examining the spatial, and temporal, evolution of these structures an insight into rapid wave generation during energetic events can be found. (Refereed publications #12, #21, #22, #27, #33, #37 & #40)

- **Solar EUV Spectroscopy:**

I also perform spectroscopic analysis of data from the *Extreme Ultraviolet Normal Incidence Spectrograph* (EUNIS), *Solar EUV Research Telescope and Spectrograph* (SERTS), and *Extreme-ultraviolet Imaging Spectrometer* (EIS) instruments. (Refereed publications #31, #35, #38, #39 & #43)

- **Cool-star Variability:**

I study the evolution in emission from highly-active fully convective stars. Oscillatory signals during flare events provide estimates of active-region parameters on these distant bodies. (Refereed publication #24 & #44)

PUBLICATIONS

Refereed

1. S. D. T. Grant, D. B. Jess, M. G. Moreels, R. J. Morton, D. J. Christian, I. Giagkiozis, G. Verth, V. Fedun, P. H. Keys, T. Van Doorsselaere & R. Erdélyi
Wave Damping Observed in Upwardly Propagating Sausage-mode Oscillations contained within a Magnetic Pore
Astrophysical Journal, under review (2015).
2. D. J. Christian, D. B. Jess, P. Antolin & M. Mathioudakis
H α and EUV observations of a partial CME
Astrophysical Journal, under review (2015).
3. D. B. Jess, R. J. Morton, G. Verth, V. Fedun, S. D. T. Grant & I. Giagkiozis
Multiwavelength studies of MHD waves in the solar chromosphere: An overview of recent results
Space Science Reviews, in press (2015).
4. D. B. Jess & G. Verth
Ultra-high-resolution Observations of MHD Waves in Photospheric Magnetic Structures
AGU/Wiley Book *Low-frequency Waves in Space Plasmas*, **32** (2015).
5. D. B. Jess, M. Mathioudakis & P. H. Keys
Nanoflare Activity in the Solar Chromosphere
Astrophysical Journal, **795**, 172 (2014).
6. A. C. Cadavid, J. K. Lawrence, D. J. Christian, D. B. Jess & G. Nigro
Heating Mechanisms for Intermittent Loops in Active Region Cores from AIA/SDO EUV Observations
Astrophysical Journal, **795**, 48 (2014).
7. P. H. Keys, M. Mathioudakis, D. B. Jess, D. H. Mackay & F. P. Keenan
Dynamic Properties of Bright Points in an Active Region
Astronomy & Astrophysics, **556**, 99 (2014).
8. D. B. Jess, V. E. Reznikova, T. Van Doorsselaere, P. H. Keys & D. H. Mackay
The Influence of the Magnetic Field on Running Penumbra Waves in the Solar Chromosphere
Astrophysical Journal, **779**, 168 (2013).

9. D. Kuridze, G. Verth, M. Mathioudakis, R. Erdélyi, D. B. Jess, R. J. Morton, D. J. Christian & F. P. Keenan
Characteristics of Transverse Waves in Chromospheric Mottles
Astrophysical Journal, **779**, 82 (2013).
10. M. Mathioudakis, D. B. Jess & R. Erdélyi
Alfvén Waves in the Solar Atmosphere: From Theory to Observations
Space Science Reviews, **175**, 1 (2013).
11. D. Kuridze, M. Mathioudakis, A. F. Kowalski, P. H. Keys, D. B. Jess, K. S. Balasubramaniam & F. P. Keenan
The Failed Filament Eruption inside a Coronal Mass Ejection in Active Region 11121
Astronomy & Astrophysics, **552**, A55 (2013).
12. P. H. Keys, M. Mathioudakis, D. B. Jess, S. Shelyag, D. J. Christian & F. P. Keenan
Tracking Magnetic Bright Point Motions Through the Solar Atmosphere
Monthly Notices of the Royal Astronomical Society, **428**, 3220 (2013).
13. R. J. Morton, G. Verth, D. B. Jess, D. Kuridze, M. S. Ruderman, M. Mathioudakis & R. Erdélyi
Observations of Ubiquitous Compressive Waves in the Sun's Chromosphere
Nature Communications, **3**, 1315 (2012).
14. M. Mathioudakis, D. B. Jess & R. Erdélyi
Alfvén Waves in the Solar Atmosphere: from Theory to Observations
Space Science Review, November Edition (2012).
15. D. B. Jess, I. De Moortel, M. Mathioudakis, D. J. Christian, K. P. Reardon, P. H. Keys & F. P. Keenan
The Source of Three-minute Magneto-acoustic Oscillations in Coronal Fans
Astrophysical Journal, **757**, 160 (2012).
16. D. Kuridze, R. J. Morton, R. Erdélyi, G. D. Dorrian, M. Mathioudakis, D. B. Jess & F. P. Keenan
Transverse Oscillations in Chromospheric Mottles
Astrophysical Journal, **750**, 51 (2012).
17. D. B. Jess, S. Shelyag, M. Mathioudakis, P. H. Keys, D. J. Christian & F. P. Keenan
Propagating Wave Phenomena Detected in Observations and Simulations of the Lower Solar Atmosphere
Astrophysical Journal, **746**, 183 (2012).
18. D. B. Jess, D. J. Pascoe, D. J. Christian, M. Mathioudakis, P. H. Keys & F. P. Keenan
The Origin of Type 1 Spicule Oscillations
Astrophysical Journal Letters, **744**, L5 (2012).
19. J. K. Lawrence, A. C. Cadavid, D. J. Christian, D. B. Jess & M. Mathioudakis
Rapid Fluctuations in the Lower Solar Atmosphere
Astrophysical Journal Letters, **742**, L24 (2011).
20. V. Fedun, G. Verth, D. B. Jess & R. Erdélyi
Frequency Filtering of Torsional Alfvén Waves by Chromospheric Magnetic Fields
Astrophysical Journal Letters, **740**, L46 (2011).
21. P. H. Keys, M. Mathioudakis, D. B. Jess, S. Shelyag, P. J. Crockett, D. J. Christian & F. P. Keenan
The Velocity Distribution of Photospheric Magnetic Bright Points
Astrophysical Journal Letters, **740**, L40 (2011).
22. I. Ballai, D. B. Jess & M. Douglas
TRACE Observations of Driven Loop Oscillations
Astronomy & Astrophysics Letters, **534**, A13 (2011).

23. D. Kuridze, M. Mathioudakis, D. B. Jess, S. Shelyag, D. J. Christian, F. P. Keenan & K. S. Balasubramaniam
Small-scale H α Jets in the Solar Chromosphere
Astronomy & Astrophysics, **533**, A76 (2011).
24. D. J. Christian, M. Mathioudakis, T. Arias, M. Jardine & D. B. Jess
The Search for Super-saturation in Chromospheric Emission
Astrophysical Journal, **738**, 164 (2011).
25. P. H. Keys, D. B. Jess, M. Mathioudakis & F. P. Keenan
The Chromospheric Velocities of a C-class Flare
Astronomy & Astrophysics, **529**, A127 (2011).
26. R. J. Morton, R. Erdélyi, D. B. Jess & M. Mathioudakis
Observations of Sausage Modes in Magnetic Pores
Astrophysical Journal Letters, **729**, L18 (2011).
27. P. J. Crockett, M. Mathioudakis, D. B. Jess, S. Shelyag, F. P. Keenan & D. J. Christian
The Area Distribution of Solar Magnetic Bright Points
Astrophysical Journal Letters, **722**, L188 (2010).
28. D. B. Jess, M. Mathioudakis, D. J. Christian, P. J. Crockett & F. P. Keenan
A study of Magnetic Bright Points in the Na I D₁ line
Astrophysical Journal Letters, **719**, L134, (2010).
29. S. Shelyag, M. Mathioudakis, F. P. Keenan & D. B. Jess
A Photospheric Bright Point Model
Astronomy & Astrophysics, **515**, 107, (2010).
30. D. B. Jess, M. Mathioudakis, P. K. Browning, P. J. Crockett & F. P. Keenan
Microflare Activity driven by Forced Magnetic Reconnection
Astrophysical Journal Letters, **712**, L111, (2010).
31. F. P. Keenan, R. O. Milligan, D. B. Jess, K. M. Aggarwal, M. Mathioudakis, R. J. Thomas, J. W. Brosius & J. M. Davila
Emission lines of Fe XI in the 257–407 Å wavelength region observed in solar spectra from EIS/Hinode and SERTS
Monthly Notices of the Royal Astronomical Society, **404**, 1617, (2010).
32. D. B. Jess, M. Mathioudakis, D. J. Christian, F. P. Keenan, R. S. I. Ryans & P. J. Crockett
ROSA: a high cadence, synchronized multi-camera solar imaging system
Solar Physics, **261**, 363, (2010).
33. P. J. Crockett, D. B. Jess, M. Mathioudakis & F. P. Keenan
Automated Detection and Tracking of Solar Magnetic Bright Points
Monthly Notices of the Royal Astronomical Society, **397**, 1852, (2009).
34. D. B. Jess, M. Mathioudakis, R. Erdélyi, P. J. Crockett, F. P. Keenan & D. J. Christian
Alfvén Waves in the Lower Solar Atmosphere
Science, **323**, 1582, (2009).
35. F. P. Keenan, P. J. Crockett, K. M. Aggarwal, D. B. Jess & M. Mathioudakis
Ultraviolet and extreme-ultraviolet line ratio diagnostics for O IV
Astronomy & Astrophysics, **495**, 359, (2009).
36. D. B. Jess, M. Mathioudakis, P. J. Crockett & F. P. Keenan
Do all Flares have White Light Emission?
Astrophysical Journal Letters, **688**, L119, (2008).

37. G. Verth, R. Erdélyi & D. B. Jess
Refined Magneto-Seismological Technique for the Solar Corona
Astrophysical Journal Letters, **687**, L45, (2008).
38. F. P. Keenan, D. B. Jess, K. M. Aggarwal, R. J. Thomas, J. W. Brosius & J. M. Davila
Emission lines of Fe X in active region spectra obtained with the Solar Extreme-ultraviolet Research Telescope and Spectrograph
Monthly Notices of the Royal Astronomical Society, **389**, 939, (2008).
39. D. B. Jess, D. M. Rabin, R. J. Thomas, J. W. Brosius, M. Mathioudakis & F. P. Keenan
Transition-Region Velocity Oscillations Observed by EUNIS-06
Astrophysical Journal, **682**, 1363, (2008).
40. D. B. Jess, M. Mathioudakis, R. Erdélyi, G. Verth, R. T. J. McAteer & F. P. Keenan
Discovery of Spatial Periodicities in a Coronal Loop using Automated Edge-Tracking Algorithms
Astrophysical Journal, **680**, 1523, (2008).
41. D. B. Jess, R. T. J. McAteer, M. Mathioudakis, F. P. Keenan, A. Andic & D. S. Bloomfield
Twisting Flux Tubes as a cause of Micro-Flaring Activity
Astronomy & Astrophysics, **476**, 971, (2007).
42. D. B. Jess, A. Andic, M. Mathioudakis, D. S. Bloomfield & F. P. Keenan
High-Frequency Oscillations in a Solar Active Region observed with the Rapid Dual Imager
Astronomy & Astrophysics, **473**, 943, (2007).
43. F. P. Keenan, D. B. Jess, K. M. Aggarwal, R. J. Thomas, J. W. Brosius & J. M. Davila
Fe XIII emission lines in active region spectra obtained with the Solar Extreme-Ultraviolet Research Telescope and Spectrograph
Monthly Notices of the Royal Astronomical Society, **376**, 205, (2007).
44. M. Mathioudakis, D. S. Bloomfield, D. B. Jess, V. S. Dhillon, & T. R. Marsh
The periodic variations of a white-light flare observed with ULTRACAM
Astronomy & Astrophysics, **456**, 323, (2006).

Non-refereed

1. D. H. Wooden, C. E. Woodward, D. E. Harker, M. S. Kelley, M. Sitko, W. T. Reach, I. De Pater, R. D. Gehrz, L. Kolokolova, A. L. Cochran, A. J. McKay, K. Reardon, G. Cauzzi, G. Tozzi, D. J. Christian, D. B. Jess, M. Mathioudakis, C. M. Lisse, J. P. Morgenthaler & M. M. Knight
Comet C/2012 S1 (ISON): Observations of the Dust Grains from SOFIA and of the Atomic Gas from NSO Dunn and McMath-Pierce Solar Telescopes
American Geophysical Union, P24A-07 (2013).
2. A. C. Cadavid, J. K. Lawrence, D. J. Christian, D. B. Jess, & M. Mathioudakis
Turbulent Fluctuations in G-band and K-line Intensities Observed with the Rapid Oscillations in the Solar Atmosphere (ROSA) Instrument
The Second ATST-EAST Meeting: Magnetic Fields from the Photosphere to the Corona ASP Conference Proceedings, **43**, 75 (2012).
3. J. K. Lawrence, D. J. Christian, A. C. Cadavid, D. B. Jess & M. Mathioudakis
Coupled Effects of a Perturbation in a Complex Structure Observed with SDO/AIA, SDO/HMI and ROSA/HARDcam
American Geophysical Union, SH51A-2197 (2012).
4. J. K. Lawrence, D. J. Christian, A. C. Cadavid, D. B. Jess & M. Mathioudakis
Rapid Oscillations in the Solar Atmosphere: Spectra and Physical Effects
Bulletin of the American Astronomical Society, **43**, (2011).

5. D. J. Christian, D. B. Jess, M. Mathioudakis & F. P. Keenan
ROSA: A High-cadence, Synchronized Multi-camera Solar Imaging System
Bulletin of the American Astronomical Society, **43**, (2011).
6. A. Andic, W. Cao, P. R. Goode, & D. B. Jess
Oscillatory Behavior and its Connection to Granulation
Bulletin of the American Astronomical Society, **41**, 822, (2009).
7. A. Andic, D. B. Jess, M. Mathioudakis, F. P. Keenan, & D. S. Bloomfield
Possible Connection Between Umbral and Bright Point Oscillations
Bulletin of the American Astronomical Society, **41**, 818, (2009).
8. D. B. Jess, R. T. J. McAteer, M. Mathioudakis, F. P. Keenan, A. Andic & D. S. Bloomfield
Twisting Flux Tubes as a cause of Micro-Flaring Activity
Proc. of IAUS247, **247**, 360, (2008).
9. A. Andic, M. Mathioudakis, F. P. Keenan, D. B. Jess, & D. S. Bloomfield
High frequency oscillations in the solar chromosphere and their connection with heating
Proc. of IAUS247, **247**, 312, (2008).
10. D. B. Jess, M. Mathioudakis, R. Erdélyi, G. Verth, R. T. J. McAteer & F. P. Keenan
Solar Feature Tracking in both Spatial and Temporal Domains
Proc. of IAUS247, **247**, 288, (2008).
11. R. J. Thomas, D. M. Rabin, J. P. Haas, B. J. Kent, W. Paustian & D. B. Jess
Absolute Radiometric Calibration of EUNIS-06
American Astronomical Society Meeting 210, 25.08, (2007).

TELESCOPE PROPOSALS

Key successful proposals as Principle/Co-Investigator

- *Solar Magnetism – Waves, Flares and Coronal Connectivity*
Dunn Solar Telescope, USA, January 2015.
- *Nanoflare Activity in the Lower Solar Atmosphere*
Dunn Solar Telescope, USA, August 2014.
- *An Uninterrupted View of Propagating Slow Mode Waves*
Dunn Solar Telescope, USA, March 2013.
- *Signatures of Wave Reflection in the Quiescent Solar Chromosphere*
Dunn Solar Telescope, USA, February 2012.
- *Temporal and Spatial Characteristics of Solar Flares*
Dunn Solar Telescope, USA, July 2011.
- *Temporal and Spatial Characteristics of Solar Flares*
Dunn Solar Telescope, USA, February 2011.
- *The Chromosphere at High Time Resolution*
Dunn Solar Telescope, USA, October 2010.
- *High-resolution Magnetograms of Evolving Active Regions*
Michelson Doppler Imager, SoHO spacecraft, March 2010.
- *Evolving Active Regions at High Resolution*
Dunn Solar Telescope, USA, March 2010.

- *Calibration of Ground-based Magnetograms using MDI*
Michelson Doppler Imager, SoHO spacecraft, October 2009.
- *ROSA Magnetic Field Calibration*
Dunn Solar Telescope, USA, October 2009.
- *Mode Coupling in the Lower Solar Atmosphere*
Dunn Solar Telescope, USA, May 2009.
- *Observational Signatures of Alfvén Waves in the Lower Solar Atmosphere*
Dunn Solar Telescope, USA, February 2009

I have also been Co-Investigator on 8 additional, successful telescope proposals spanning 2005–2012. These have included premier solar facilities such as the Swedish Solar Telescope (SST, La Palma), the Dunn Solar Telescope (DST, USA), and the Hinode spacecraft.