Covers events between 1 May and 31 August 2017

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Departing staff
• Dr. Panos Sidiropoulos moved on to Kings College London in May.

New staff
• The Plasma Group welcomed Marina Georgiou who is a new PDRA, working on storm time dynamics of the Earth's radiation belts.
• James Yardley working with Alan Spencer
• Robert Aitken working with Alex Rousseau
• Natasha Magennis - Teaching Admin working from Taviton Street UCL

• Marina Georgiou, working with Jonny Rae
• Lizzie Hudson - Marketing Admin working from Taviton Street UCL
• Filip Osimek - Electronics Group
• Dimitra Stamatianou - Departmental Administrator

Promotions
• Congratulations to Professor Andrew Fazakerley, who was selected to become MSSL's next Director and Head of Department
• Jason McEwen has been promoted to Reader in Astrophysics.
Visitors
The Astrophysics group hosted (and is hosting):

- Wen Wu, Jia-Cheng Liu, Ming Yang, Qin Han, Suyei Chan (Nanjing)
- Alessio Spurio-Mancini (Heidelberg)
- Elena Sellentin (Geneva)
- Masaki Numazawa (Tokyo Metropolitan)
- Andrea Miglio (Birmingham)
- Suheyi Chan (St. Andrews)
- Xiangyu Jin, Xiaoxi Song (UCL MAPS Dean’s summer students)
- Qiong Wu (CAS-NSSC)
- Albert Kong (NTHU)
- Augustin Mavor-Parker (RAS summer internship)
- Hugo Carpenter (high-school placement)
- Nathan Bennet, Isabella Smith, Aagash Aravinthan (Nuffield high-school summer students).

The Imaging Group welcomed:

- Claudia Pipitone from University of Palermo
- Bingxin Liu from University Dalian Maritime University.

The Plasma Group welcomed:

- Mayur Bakrania (UCL, 3rd year), summer student at MSSL in 2016, returned to the Lab this summer to work with Georgina Graham and Jonathan Rae. Mayur used an empirical model, constrained by Cassini interplanetary observations, to model suprathermal electron evolution in the solar wind from the Sun to 5 AU
- Alex Luff (Oxford, 2nd year), an MSSL work experience student in 2014, returned to the lab this summer to work with Jasmine Sandhu and Colin Forsyth. Alex explored changes in the magnetic field topology in the nightside magnetosphere prior to substorm onset through the analysis of ground based magnetometer observations.

The Solar Group welcomed:

- Daniel Ryan from NASA/GSFC, who gave a seminar
- Christopher Nelson from the University of Sheffield who gave a seminar
- Hamish Reid from the University of Glasgow who spent a month working with the Solar group
- Alicia Harris from Warwick University who spent 6 weeks working with David Long and Deb Baker and gave a seminar
- Tishtrya Mehta from St. Andrews University who spent 4 weeks working with Lucie Green.

A workshop funded by the Daiwa award, and organised by Louise Harra, was held in July with participants from Japan and the US. The purpose was to study a period of solar activity that was monitored by Hinode and IRIS.

Prizes and Awards

- Lucie Green was awarded the Lise Meitner Medal and Prize by the Institute of Physics
- Eleni Bohacek received the Lunar Resources Award for outstanding contributions to 2017 NASA Frontier Development Laboratory programme
- PhD Student Si-Ting Xiong won Best Poster at Centre for Planetary Science Meeting July
- UK Gaia Science Team (including Mark Cropper, Mike Smith, George Seabroke, Kevin Benson, Chris Dolding, Steve Baker and Howard Huckle) won The Sir Arthur Clarke Awards, the Space Achievement – Academic Study/Research award “For its role in processing and analysing data from the Gaia star mapping mission as its contribution to the European Data Processing and Analysis Consortium.”
- Ziri Younsi is awarded a Leverhulme Fellowship to work on “New Frontier in Black Hole Physics: Polarised Scattering Radiative Transport” hosted by Kinwah Wu starting May 2018
- Christopher Owen was presented the RAS James Dungey Lectureship, for distinguished and eloquent speaking on a suitable topic in geophysics, at the National Astronomy Meeting, University of Hull, UK (2 – 6 Jul)
- Zhonghua Yao was awarded the RAS Winton Capital Award for the work that he performed whilst at MSSL, for research by a Post-Doctoral Fellow in a UK institution in astronomy or geophysics whose career has shown the most promising development.
- Georgina Graham won an Outstanding Student Poster Award for her poster entitled “Evolution of Solar Wind Strahl: Observations from Cassini’s Interplanetary Voyage” at the Solar Heliospheric and Interplanetary Environment (SHINE) Conference in Saint-Sauveur, Quebec, Canada (23 – 28 Jul).
Appointments

- Andrew Coates was appointed as External Examiner for OU MSc course in Space Science
- Kinwah Wu is appointed as “International Expert” by the Chinese Academy of Sciences, who will fund his multiple visits to PMO (Nanjing) and NAOC (Beijing), in the next three years
- Congratulations to Jasmine Sandhu and Jonathan Rae who were both elected to be members of the Magnetosphere Ionosphere Solar Terrestrial (MIST) Council.

Grants and Contracts Awarded

- EU COST (European Cooperation in Science and Technology) Action PHAROS (MSSL Co-I: Silvia Zane) was selected (follow on of COMPSTAR) to study neutron stars and gravitational waves.
- Tom Kitching has been awarded, as a PI, EWC (European Works Council) H2020 grant for Euclid weak lensing network, and leading 11 institutes and total €1.56 M funding over 4 years, MSSL to receive €~240 k.

Mission Status and Developments

**ExoMars:** Development continuing and the team are working on the EM and LTM. PanCam CDR was held at MSSL on 17-19 July.

**Gaia:** Radial velocities produced by MSSL code is being validated by others within Gaia collaboration, ready for release in Gaia’s second data release in April 2018. MSSL Gaia team is preparing for software delivery deadlines between Sept and March for Gaia’s third data release in 2020.

**Euclid:** MSSL chaired and co-hosted Euclid Consortium meeting in London, 5-8 June. We have moved on to the Flight Model programme. The full Engineering Model and Structural Thermal Model are here at MSSL, for final testing before delivery to ESA (Thales Alenia Space and Airbus respectively) in the autumn.

**Solar Orbiter EUI:** is delivered and on the spacecraft panel. Well done to the team! Lots of testing still to be done.

**Solar Orbiter SWA:** The period has been an exceptionally busy one for the MSSL SWA team with the delivery to MSSL of the flight hardware from our partner institutes. The Heavy Ion Sensor (HIS) arrived from the US in May and the Proton Alpha Sensor (PAS) from France on 13 June. The DPU from Italy was also physically delivered on July 6, but still needed final testing and qualification work, much of which was undertaken by MSSL personnel, in addition to the suite level testing with the 3 sensors. However, the DPU was then delivered to AIRBUS in Stevenage on Aug 14. The sensors are still at MSSL, and the team are working on a number of NCR’s and the calibration program for the Electron Analyser System (EAS) ahead of their deliveries to Airbus, currently scheduled for late November.

The full MSSL SWA Operations Team has been assembled (Gethyn Lewis, Gill Watson, Chandra Anekallu, Ali Varsani), and attended en masse the 10th Science Operations Working Group at ESAC in Madrid, 10 –12 Jul, and subsequently held a bilateral meeting with the ESA operations teams on 13 Jul.

**SMILE** An initial 2-year grant to support SMILE development in the UK has been allocated by the UKSA.

Teaching Developments

- Members of the Space Plasma and Solar Groups delivered a course on the science of space weather to some Met Office Space Weather Forecasters. This included discussion of the St Patrick’s Day (2015) geomagnetic storm and precursor solar events and solar wind signatures, as well as the predictions that the Met Office made at the time.

- **APM Project Management Qualification CPD Course**

In the spring UCL Centre for System Engineering took over the running of the well-established APM Project Management Qualification course. This is a 5-day professional training course, accredited by the Association for Project Management (APM), which aims to provide learners with an effective grounding in project management. This course was developed by Alan Smith in collaboration with Jane Britton and Barry Bugden, based on the authors’ broad experience in space technology and research, industrial project management and business experience. Originally run from within UCL’s School of Management (known as Management Studies Centre when the course was established in July 1999), the decision was taken to bring the course into the CPD portfolio already offered by the Centre for System Engineering. Courses already offered include Introduction to System Thinking, Defence Systems and Railway Systems as well as bespoke industry training to clients such as JLR, TFL and Boeing. Recent
attendees of the PMQ course said “The best thing about the course was undoubtedly the people teaching it – they’re experts from UCL’s Mullard Space Science Laboratory and School of Management”. They also commented on the diverse backgrounds of attendees, who ranged across different industries, from charities to construction.

The course director is now Matt Whyndham – he has been teaching and editing the course for some years already.

Matt Whyndham

– and he has been joined by Elizabeth Hudson, who has been recruited as Programme Administrator and Marketing Officer (based at Taviton Street).

Elizabeth Hudson

Publications – Refereed

Published


Burnet, + (Cai): Applying physical science techniques and CERN technology to an unsolved problem in radiation treatment for cancer: the multidisciplinary ‘VoxTox’ research programme, 2017, CERN IdeaSquare Journal of Experimental Innovation, 1, 1

Cai, +: A three-stage approach for segmenting degraded color images: smoothing, lifting and thresholding (SLAt), J SciComput, 72, 3


Dalmasse, Kevin, Valori, Gherardo, Jing, Ju, Pariat, Etienne, and Demoulin, Pascal: Studying the transfer of magnetic helicity in solar active regions AAS/Solar Physics Division Meeting, 48, 112.06 (2017)


late extreme ultraviolet phases in a non-eruptive circular-ribbon flare A&A p, 604, A76 (2017) DOI: 10.1051/0004-6361/201629654
Miglio, + (Kawata): PLATO as it is: a legacy mission for Galactic archaeology, 2017, AN, 338, 644
Rae, I.J., et al., Using Ultra Low Frequency waves and their characteristics to diagnose key physics of substorm onset, Geoscience Letters, resubmitted
Sandhu, J. K. et al., Variations of high-latitude geomagnetic pulsation frequencies: A comparison of time-of-flight estimates and IMAGE magnetometer observations, resubmitted to J. Geophys. Res.
Sidiropoulos, P. and Muller, J.-P.: A systematic solution to multi-instrument co-registration of high-resolution planetary images to an orthorectified baseline, IEEE Transactions on Geoscience and Remote Sensing, accepted for publication
Sidiropoulos, P.. Muller, J.-P., Watson, G., Michael, G., and Walter, S.: Automatic CoRegistration and Orthorectification (ACRO) and subsequent mosaicing of NASA high-resolution imagery over the Mars MC11 quadrangle, using HRSC as a baseline, Planetary and Space Science, accepted for publication


Watt, C. E., Rae I. J. et al., The parameterization of wave-particle interactions in the Outer Radiation Belt, JGR commentary

Yao, Z. Y., et al., An Explanation of Auroral Intensification During the Substorm Expansion Phase, submitted to JGR.


Publications – Non-Refereed

- Article for the Conversation Elon Musk releases details of plan to colonise Mars – here’s what a planetary expert thinks, 21 June (mentioned ExoMars)
- Desai, R. T., Article for the Conversation Saturn's moon Titan could host primitive life forms and reveal how life first formed on Earth, 27 Jul
- Desai, R. T., Article for the IOP Blog, Magnetosphere conference was out of this world, 19 Jul

PhDs/MPhil Awarded.

- Alice Foster was awarded her PhD following final corrections to her thesis.

Invited Talks and Conferences

- Wellbrock, A., Jones, G. H., Coates, A. J. Götz, C., Mandt, K. E., Observations of two CMEs from inside the comet 67P coma and upstream of the comet, presented at "The new view of comet coma processes after Rosetta: The importance of electrons" (invited), Bratislava, Slovakia, 24-26 May.
Magnetospheres of the outer planets conference, Uppsala, Sweden, 12 – 16 June:
- Hunt, G., S.W.H. Cowley, E.J. Bunce, G. Provan, M.K. Dougherty, I I. Alexeev, E.S. Belenkaya, V.V. Kaledaev and A.J. Coates, Field-aligned currents observations close to Saturn: Past and present
- Rymer, A., A. Persoon, M. Morooka, A. Coates, D.G. Mitchell, S. Ye, M. Perry, Are the Enceladus Plumes a Hotbed of Negativity?
- Wellbrock, A., R. Caro-Carretero, Y. Cao, A.J. Coates, G.H. Jones, Observations of photoelectron energy peaks in Titan’s ionosphere
- Davies, E., A. Masters, M. Dougherty, A. Coates, K.C. Hansen, N. Sergis, Variability in high latitude magnetic field observations at Saturn
- Felici, M., C. Arridge, A. Coates, R. Wilson, M. Thomsen, D. Reisenfeld, Survey of plasma composition in Saturn’s magnetosphere
- Jones, G.H., A.J. Coates, M. Thomsen, The prevalence of negative ions in Saturn’s inner magnetosphere

- PhD Student Jacqueline Campbell: seminar at NASA JPL, California, June, poster presentation CPS Meeting, UCL, July
• PhD Student Si-Ting Xiong: poster presentation CPS Meeting, UCL, July
• PhD Student Kiky Putri: oral presentation CPS Meeting, UCL, July
• PhD Student Lang Feng: poster presentation at ESA Fringe conference at Helsinki, Finland June poster presentation at ESA-Dragon conference at Copenhagen, Denmark June.

• Graziella Branduardi-Raymont
  o Gave a talk on SMILE at the X-ray Universe Symposium, Rome, 6-9 June
  o Gave a talk on SMILE at the IAU Symposium on Space Weather and the Heliosphere: Processes and Forecasts, Exeter, 17-21 July.

• Xiao Hao Cai
  o Gave a talk on “High-dimensional uncertainty estimation with sparse priors for radio interferometric imaging” at Turing/LMS Workshop “Inverse Problems and Data Science”, Edinburgh, 8-10 May
  o Gave an invited talk on “High-Dimensional Uncertainty Estimation with Sparse Priors for Radio Interferometric Imaging” at workshop on Compressive Sensing, Bath, 1 June.

• Denis Gonzalez Caniulef gave a talk on “Optical and X-ray polarimetry of strongly magnetized neutron stars” at National Astronomy Meeting, Hull, 2-6 July.

• Daisuke Kawata:
  o Gave seminar on "Impacts of Radial Mixing on the Galactic Thick and Thin Disks and Gaia DR1". Warwick, 31 May
  o Gave a talk on “Impacts of Radial Migration on the Galactic Thick and Thin Disks” at IAU symposium 334 “Rediscovering our Galaxy”, Potsdam, 10-14 July
  o Gave a talk on “Disk Chemodynamicsderived by bar and spiral arms”, Ascona, Switzerland, 23-28 July.

• Jason McEwen:
  o Gave a talk on “Informatics and Statistics” at RAS discussion meeting on LSST, 12 May
  o Gave a talk on “Wavelet location of isotropic random field on spherical manifold and cosmological implications” at Isotropic Fields in Astrophysics, Cardiff, 29-30 June
  o Gave a talk on “Big data in cosmology”, at Workshop in Theory of Big Data, UCL, 26-28 June
  o Gave a talk on “High-dimensional uncertainty estimation with sparse priors for radio interferometric imaging”, at Statistical Foundations of Uncertainty Quantification for Inverse Problems, University of Cambridge, 19-22 July.

• Ellis Owen
  o Gave a talk on "Cosmic rays in starburst protogalaxies" at the Astronomical Society of the Republic of China (Taiwan's NAM) at Miaoli, Taiwan on 19 May
  o Gave a seminar on “The implications of cosmic ray heating in and around the interstellar medium of high-redshift starbursts”, ICRR, Japan, 5 June
  o Gave a seminar on "Cosmic rays from high-redshift starburst galaxies and their role in heating and ionizing the intergalactic and circum-galactic medium", the Kavli Institute for the Physics and Maths of the Universe (IPMU), Tokyo, 8 June
  o Gave a talk on “Cosmic rays in starburst proto-galaxies”, at Asia-Pacific Region IAU Meeting, Taipei, Taiwan ROC, 3-7 July
  o Gave a talk on “Cosmic rays in early star-forming galaxies and their effects on the interstellar medium”, at International Cosmic Ray Conference, Busan, Korea, 12-20 July.

• George Seabroke gave a talk on “Gaia DR1: Contents, Access and Use” at National Astronomy Meeting 2017, Hull, 2-6 July

• Myrto Symeonidis
  o Gave a seminar at the University of Sussex, “Putting AGN centre stage”, Sept
  o Gave a talk at the “New Results in X-ray Astronomy meeting” in Durham, Sept.

• Chris Wallis gave a talk on “Sparse image reconstruction on the sphere: Analysis and Synthesis” at Turing/LMS Workshop “Inverse Problems and Data Science”,

Edinburgh, 8-10 May.

- Kinwah Wu has been invited to spend a few weeks between Aug 2017 and Jul 2018 at the Perimeter Institute through their Visitor Program.

- Lloyd Woodham attended the STFC Advanced Summer School in Solar System Plasmas at the University of Central Lancashire, Preston, (28 Aug – 1 Sep).

- Allan Macneil and Lloyd Woodham attended the UCAR Heliophysics Summer School in Boulder, CO, USA (1 – 8 Aug).

- Georgina Graham and Allan Macneil attended the Solar Heliospheric and Interplanetary Environment Conference in Saint-Sauveur, Quebec, Canada (23 – 28 Jul). Georgina Graham was invited to present her work during the session entitled "Disentangling Expansion Effects and Collisional Relaxation in the Solar Wind". Georgina and Allan presented posters at the conference entitled "Evolution of Solar Wind Strahl: Observations from Cassini’s Interplanetary Voyage" and "Tests for Coronal Electron Temperature Signatures in Suprathermal Electron Populations at 1 AU" respectively.

- Marina Georgiou contributed to a poster entitled "Geospace driver effects on electron acceleration and loss in the outer Van Allen radiation belt" that was presented at the UN/USA Workshop on International Space Weather Initiative in Boston, USA (31 Jul – 4 Aug).

- Colin Forsyth and Nadine Kalmoni attended the International Association of Geomagnetism and Aeronomy (IAGA) Joint Assembly in Cape Town, South Africa (28 Aug – 1 Sep). Colin presented a Division III Reporter Review on Auroral Processes and a contributed talk on field-aligned currents associated with substorms. Nadine gave an invited talk on auroral beads and a contributed talk on plasma instabilities at substorm onset.

- Louise Harra gave an invited talk on Solar Orbiter science with Hinode/IRIS in Seattle.

- Lucie Green:
  - Gave an invited talk at the Metamaterials conference in Marseille
  - Gave an invited plenary at the National Astronomy Meeting in Hull
  - Gave a seminar at the University of Hull.

- David Long
  - Attended the 1st Europe-China Solar Physics meeting in Kunming, China and gave a talk
  - Attended the Asia-Oceania Geophysical Society annual meeting in Singapore and gave a talk
  - Attended the National Astronomy Meeting in Hull and gave a talk.

- Deb Baker, Gherardo Valori, Alex James, Jack Jenkins and Lidia van Driel-Gesztesy attended the Flux Emergence Workshop in Budapest, each giving a talk.

- Jack Jenkins attended the advanced summer school in solar system plasma physics at UCLAN and gave a talk.

- Magnus Woods
  - Gave a seminar at the University of Nagoya
  - Gave a seminar at National Astronomical Observatory of Japan
  - Gave a seminar at Institute of Space and Astronautical Sciences, JAXA.

Press Releases
- ESA/NASA Press release on Ravi Desai’s paper: Has Cassini found a universal driver for prebiotic chemistry at Titan? Further articles covered by >20 news outlets

Outreach
- Oliver Price: Talk to Foredown Astronomers, Brighton on results from the Rosetta mission.
- Roger Stabbins and Oliver Price: Mars rover mission simulation workshop for MSSL work experience students, 10 July.
- A.J. Coates:
  - Talk for MSSL work experience students on ExoMars – and PanCam for the 2020 rover, 11 July
  - Talk for Science Fiction Theatre film club, at Institute of Light, Hackney on Europa, Enceladus, Mars and Titan – favourites for life beyond Earth? (talk before 2010 film), 18 July (included ExoMars, JUICE, Europa missions)
  - Talk for London International Youth Science Forum visit to MSSL, 1 Aug (included ExoMars)
• Phd Students Kiky Putri and Jacqueline Campbell delivered an Imaging workshop at MSSL Work Experience Week July

• Graziella Branduardi-Raymont
  o Gave a presentation at the annual careers conference at Collyer’s College, Horsham, 30 June.
  o Gave a specialist lecture on ‘Space Astronomy and the Exotic Universe’ at the London International Youth Science Forum, 31 July.

• Jennifer Chan gave a talk on cosmic magnetism on “Seeing the magnetised Universe using light - techniques to study large-scale magnetic fields”, Croydon Astronomical Society on 26 May.

• George Seabroke gave a webinar to two schools on entitled: "Galactic Speed Camera: How the Gaia satellite used the Doppler Effect to catch speeding stars", 25 May.

• Kinwah Wu gave a public demo-STEM/physics lecture in Hong Kong to pre-university students who intended to come to UK for undergraduate study. The event was organised by CANA Elite.


• Members of the Plasma Group took part in the MSSL work experience week (10 – 14 Jul). Georgina Graham helped organise the week and was a project mentor for the group project on robotic exploration of Titan. Allan Macneil gave the Plasma Physics workshop. Nadine Kalmoni and Jasmine Sandhu were project mentors for the group project on human exploration of the outer planets. Colin Forsyth and Rob Wicks were panel judges for the group project presentations.

• Colin Forsyth
  o Gave a talk to Sutton and Cheam Radio Society on Space Weather, (15 Jul)
  o Gave 5 talks at National Space Academy careers event (Yr 9/10) at National Space Centre (22 Jul)
  o Was the Keynote talk at National Space Academy careers event at Birmingham Airport, (29 Jul)

• Alex James
  o Ran a workshop and supervised a project during the MSSL work experience week
  o Gave a talk to visiting students from the London International Youth Science Forum.

• Jack Jenkins ran the icebreaker activity for the MSSL work experience week.

• Lucie Green
  o Gave a talk at Winchester Science Festival
  o Gave a public talk on the Sun and space weather as part of the IAU meeting at the University of Exeter
  o Gave a talk at West Buckland School.

Media Broadcasts and Features

• Andrew Coates:
  o Interview for BBC World Service Science in Action on Cassini, 4 May
  o Comment in Newsweek on Mars climate and habitability (mentioned ExoMars), 2 June
  o Interview for the Guardian on Mars exploration and Elon Musk plans (mentioned ExoMars), 16 (electronic), 19 (Print) June
  o Quoted in Newsweek on Planet Nine/10, 23 June
  o Interview for BBC World Service documentary on Cassini – mission, results and mission end, transmitted 22 Aug
  o Quote for the Guardian on Mars habitability and ExoMars, 6 July
  o Interview for Financial Times on Elon Musk colonization plans (included ExoMars), 7 July
  o Interview for BuzzFeed about end of the Cassini mission, Aug
  o Quoted by ‘i’ newspaper on planetary protection at Mars, Europa, 3 Aug
Interview on BBC World Service Newsday, on Cassini (mentioned ExoMars also), 14 Aug.

- Robert Wicks was interviewed on BBC News and Aljazeera about the renaming of the NASA Solar Probe Plus mission in honor of Eugene Parker.
  
  See: https://www.ucl.ac.uk/rdr/irdr/general-news/cubsats_interview.

- Ravi Desai Appeared on Sky at Night episode Cassini the Gamechanger.


- Lucie Green
  
  ○ Gave interviews on various TV channels on the solar eclipse
  ○ Presented a programme on BBC World Service about the Cassini mission.

Other news

The Cosmoparticle Initiative, which brings together researchers from MSSL with Physics & Astronomy (Astrophysics and HEP groups), is now on the web at www.ucl.ac.uk/cosmoparticle.

Next Issue

The next issue of The Newsletter (Volume 14, Issue 3) will be published in February 2018. This will cover activities from 1 Sept to 31 Dec 2017.