



## Department of Space and Climate Physics Newsletter

### Volume 2, Issue 2

30<sup>th</sup> September 2004

Covers events between 1<sup>st</sup> June 2004 and 31<sup>st</sup> August 2004

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#### General News

- On 16 July the Laboratory celebrated John Raymont's retirement, after a 43-year career at UCL, with a buffet lunch and several gifts. John wants to express again his deepest gratitude and appreciation for a wonderful send-off.
- Louisa Bradley and Tom Kennedy have a healthy baby boy named Joshua.
- Carl and Sheri Foley are now the proud parents of a baby daughter named Amelie.
- Alan Muir's second child was born on 26 August. Mother & baby Beth are well.

## **Visitors**

We welcomed the following visitors:

Deb Baker - after completing her 2nd undergraduate year in the UCL Physics and Astronomy Department, has worked through the summer with Graziella and Alex, making very good progress to start off a project which aims to produce an atlas of UV observations of galaxies obtained with the XMM-Newton Optical Monitor.

Malcolm Dunlop and Jackie Davies, both from RAL, visited in June for discussion on the high-altitude cusp studies (Cluster) and in August to discuss an ongoing magnetotail collaboration.

David Winningham and Rudy Frahm visited on 9 August (Mars Express, Cluster).

## **Prizes and Awards**

The Department's Tropical Storm Risk (TSR) venture, led by Mark Saunders, won the prestigious British Insurance Award 2004 for London Market Innovation of the Year. Presented at the Royal Albert Hall, the award was for TSR's new global Tropical Storm Tracker internet application. The project was singled out by the judges as a "service that was innovative, relevant and unquestionably an asset to the London market" (<http://www.ucl.ac.uk/news/archive/july-2004/latest/newsitem.shtml?04070115>).

## **Appointments**

Curtis Saxton has come from MPI Bonn to join the Astrophysics group as a postdoc.

Tibor Török has started as a postdoc in the Solar and Stellar Physics Group. He will concentrate on studies of magnetic helicity working also with Mitch Berger from UCL-maths.

Jian Sun has started as a postdoc in the Solar and Stellar Physics Group. He will be working on studies for a proposed instrument on the future Solar Orbiter mission.

Dr Peter Yuen joined the Department as a Research Fellow in Climate Physics.

## **Appointments (eg Editorial Boards or Committees)**

Louise Harra has been appointed as Vice-chair to COSPAR Sub-commission D2/E3.

## **Grants and Contracts Awarded**

- Climate Physics - €35k, awarded from ESA in June, for supply of Auxiliary data files for CryoSat Ground Segment processing chains, for May 04 to Aug 04. PI- Steve Baker.
- Climate Physics - Awarded in July €84k extension to CryoSat IPF1 development work for July 04 to May 05. PI- Steve Baker.
- Climate Physics - Awarded in July €73k extension to CryoSat IPF2 development work for July 04 to May 05. PI- Steve Baker.

## **Telescope/Satellite Time Awards**

### *Ground-based telescope time:*

Roberto Soria was awarded 3 nights at the Australia Telescope Compact Array (Narrabri, NSW), in December 2004, to determine the spectral index of the radio counterpart for an ultraluminous X-ray source.

### *Space-based telescope time:*

Roberto Soria was Co-I in a successful Chandra proposal which was awarded time to determine the luminosity function of the discrete X-ray sources in the barred galaxy M95. (PI: D Swartz)

## **Mission Status and Developments**

Aurora ExoMars - PICS and EM3P teams merged July 04 with MSSL responsible for stereo camera system. Input provided for parallel industrial studies.

Cassini-Huygens - Saturn Orbit Insertion 1 July 2004 (successful). Almost 7 years from launch, Cassini survived its passage through Saturn's rings making unprecedented measurements close to the planet. Initial CAPS-ELS results were presented at COSPAR (AJC) and discussed at CAPS team meeting in Marseille (AJC, et al). Cassini is currently on its long first orbit culminating in its second close visit to Saturn in late October, including a close flyby of Titan on 26 October 2004.

Cluster - 4 PEACE instruments working well.

Double Star TC-2 (polar satellite) - TC-2 launched successfully 25 July 2004. PEACE commissioning successful.

Magnetospheric MultiScale Mission (MMS) - Concept study report provided by SwRI at end of phase A study (July). Selection late 2004.

Mars Express - ASPERA-3 ELS results provided for team meeting in August (YIJS, AJC). Science paper with MSSL involvement to be published 24 September.

Solar-B EIS - The EIS instrument was delivered to Japan during the last week of August and integrated to the spacecraft. This is a major milestone for the project and many thanks to all those at MSSL involved in the project.

Solar Orbiter - the current timescale for the ESA Solar Orbiter AO is the end of next year.

Venus Express - ASPERA-4 (including MSSL/SwRI ELS) delivered to Alenia by IRF (PI) in July 2004.

## **Publications - Refereed**

S & CP authors are shown in upper case.

### **A. Published**

- BRANDUARDI-RAYMONT, G., Elsner, R.F., Gladstone, G.R., RAMSAY, G., Rodriguez, P., SORIA, R. & Waite, J.H. Jr., First observation of Jupiter by XMM-Newton, *Astron. & Astrophys.*, 424, 331-337, 2004. The paper presents the first X-ray observation of Jupiter by XMM-Newton. Images from the EPIC cameras show prominent emission from the planet's auroral spots; their spectra are modelled with a combination of unresolved emission lines, the strongest of which are from highly ionised oxygen (OVII and OVIII). The OVII identification is confirmed by the RGS, which provides the first high resolution spectral detection of X-rays from a planet. The data support the idea that Jupiter's auroral emissions originate from the capture and acceleration of solar wind ions in the planet's magnetosphere, followed by X-ray production by charge exchange. [doi:10.1051/0004-6361:20041149](https://doi.org/10.1051/0004-6361:20041149)
- BRIDGE, C.M., Hakala, P., CROPPER, M. & RAMSAY, G., Accretion stream mapping with genetically modified fireflies, *Mon. Not. R. astr. Soc.*, 351, 1423-, 2004. We apply an eclipse mapping technique using 'genetically modified fire-flies' to the eclipse light curves of two magnetic binary systems. We find the model predicts that most of the accretion material originates from close to the white dwarf in HU Aqr while in EP Dra it extends over a wide range of stream azimuth.
- CROPPER, M., Haberl, F., ZANE, S. & Zavlin, V.F., Timing analysis of the isolated neutron star RX J0720.4-3125 revisited, *Mon. Not. R. astr. Soc.*, 351, 1099-1108, 2004. [doi:10.1111/j.1365-2966.2004.07854.x](https://doi.org/10.1111/j.1365-2966.2004.07854.x).
- Haerendel, G., Georgescu, E., Glassmeier, K.H., Klecker, B., BOGDANOVA, Y.V., Reme, H. & Frey, H., [CLUSTER observes formation of high-beta plasma blobs](#), *Ann. Geophysicae*, 22, 2391-2401, 2004.
- Hakala, P, RAMSAY, & Byckling, K, Monitoring the spin up in RX J0806+15, *Mon. Not. R. astr. Soc.*, 353, 453-, 2004. New observations obtained between Nov 2003 and Feb 2004 show that the orbital period decrease of the 5 min binary RX J0806+15 is continuing. We discuss how reliably we can determine the period of RX J0806+15 using our technique and evaluate the current models which have been proposed to account for the observational properties of this source.
- Mereghetti, S., Tiengo, A., Stella, L., Israel, G.L., Rea, N., ZANE, S. & Oosterbroek, T., [Pronounced long term flux variability of the anomalous X-ray pulsar 1E1048.1-5937](#), *Astrophys. J.*, 608, 427-431, 2004.
- PAGE, M.J., SORIA, R., ZANE, S., WU, K., & Starling, R., Highly ionized Fe K-alpha emission lines from the LINER galaxy M 81, *Astron. & Astrophys.*, 422, 77-84, 2004. [doi:10.1051/0004-6361:20034451](https://doi.org/10.1051/0004-6361:20034451).
- SORIA, R. & Motch, C., A variable ultra-luminous X-ray source in the colliding galaxy NGC7714, *Astron. & Astrophys.*, 422, 915-913, 2004. [doi:10.1051/0004-6361:20040265](https://doi.org/10.1051/0004-6361:20040265).

SORIA, R., Motch, C., Read, A.M. & Stevens, I.R., X-ray flares from the ultra-luminous X-ray source in NGC5408, *Astron. & Astrophys.*, 423, 955-963, 2004. [doi:10.1051/0004-6361:20041145](https://doi.org/10.1051/0004-6361:20041145).

Svenes, K.R., Narheim, B.T., COATES, A.J., LINDER, D.R. & Young, D.T., Cassini plasma spectrometer electron measurements close to the magnetopause of Jupiter, *J. Geophys. Res.*, 109, 2004. [doi:10.1029/2003JA010254](https://doi.org/10.1029/2003JA010254).

## **B. In Press**

ASHTON, C.E., PAGE, M.J., BLUSTIN, A.J., PUCHNAREWICZ, E.M., BRANDUARDI-RAYMONT, G., MASON, K.O., Cordova, F.A. & Priedhorsky, W.C., XMM-Newton observations of warm absorbers in PG quasars, *Mon. Not. R. astr. Soc.*, 2004. We present XMM-Newton EPIC observations of warm absorbers - clouds of ionised gas - in two quasars from the PG quasar sample.

ILES, R.H.A., JONES, J.B.L., Taylor, G.C., Blake, J.B., BENTLEY, R.D., HUNTER, R., HARRA, L.K. & COATES, A.J., The effect of Solar Energetic Particle (SEP) events on the radiation exposure levels to aircraft passengers and crew: Case study of 14th July 2000 SEP event, *J. Geophys. Res.*, 2004.

Lundin, R., Barabash, S., Andersson, H., Holmström, M., Grigoriev, A., Yamauchi, M., Sauvaud, J.-A., Federov, A., Budnik, E., Thocaven, J.-J., Winningham, D., Frahm, R., Scherrer, J., Sharber, J., Asamura, K., Hayakawa, H., COATES, A.J., LINDER, D.R., Curtis, C., Hsieh, K.C., Sandel, B.R., Grande, M., CARTER, M., Reading, D.H., Koskinen, H., Kallio, E., Riihela, P., Schmidt, W., Säles, T., Kozyra, J., Krupp, N., Woch, J., Luhmann, J., McKenna-Lawler, S., Cerulli-Irelli, R., Orsini, S., Maggi, M., Mura, A., Milillo, A., Roelof, E., Williams, D., Livi, S., Bradt, P., Wurz, P. & Bochsler, P., Solar wind induced atmospheric erosion at Mars - first results from ASPERA-3 on Mars Express, *Science*, 2004.

RAMSAY, G., BRIDGE, C. M., CROPPER, M., MASON, K., Cordova, F. & Priedhorsky, W., XMM-Newton observations of the eclipsing polar EP Dra, *Mon. Not. R. astr. Soc.*, 2004. We present XMM-Newton observations of the eclipsing magnetic binary EP Dra which cover nearly 3 binary orbital cycles. We find that a different level of absorption column density is required to match the observed count rates in different energy bands and propose that this is due to the fact that different absorption components should be used to model the reprocessed X-rays, the shocked X-ray component and the UV emission and explore the affect that this has on the resulting fits to the spectrum.

Smith, A.J., MEREDITH, N.P. & O'Brien, T.P., Differences in ground observed chorus in geomagnetic storms with and without enhanced relativistic electron fluxes, *J. Geophys. Res. - Space Physics*, 2004. We compare compare and contrast ground-based VLF signatures in storms with and without enhanced post-storm fluxes of relativistic electrons to see if there are any differences that may be associated with the acceleration process. Higher levels of chorus activity are observed in storms with enhanced post-storm fluxes of relativistic electrons providing further support for a local electron acceleration mechanism driven by whistler-mode chorus waves.

SORIA, R., CROPPER, M. & Motch, C., Classifying the Zoo of ultraluminous sources, *Adv. Space Res.*, 2004.

TAYLOR, M.G.G.T., Dunlop, M.W., Lavraud, B., Vontrat-Reberac, A., OWEN, C.J., Décréau, P., Trávníček, P., Elphic, R.C., Friedel, R.H.W., DEWHURST, J.P., Wang, Y., FAZAKERLEY, A.N., Balogh, A., Rème, H. & Daly, P.W., Cluster observations of a complex high-altitude cusp passage during highly variable IMF, *Ann. Geophys.*, 2004.

TRENHOLME, D, RAMSAY, G., & FOLEY, C, Properties of serendipitous X-ray flares discovered in XMM-Newton observations, *Mon. Not. R. astr. Soc.*, 2004. We have found eight flaring sources as part of a search of the XMM-Newton public data archive for stellar X-ray flares. One of the stars shows two flares in close succession: a comparison to a pair of similar flares on the Sun suggests that homology is the more likely process driving the flare event.

## **Publications - Non-refereed**

### **A. Published**

Barabash, S., Lundin, R., Andersson, H., Gimholt, J., Holmström, M., Norberg, O., Yamauchi, M., Asamura, K., COATES, A.J., LINDER, D.R., KATARIA, D.O., CURTIS, C., Hsieh, K.C., Sandel, B.R., Federov, A., Grigoriev, A., Budnik, E., Grande, M., CARTER, M., Reading, H., Koskinen, H., Kallio, E., Riihela, P., Säles, T., Kozyra, J., Krupp, N., Livi, S., Woch, J., Luhmann, J., McKenna-Lawlor, S., Orsini, S., Cerulli-Irelli, R., Maggi, M., Morbidini, A., Mura, A., Milillo, A., Roelof, E., Williams, D., Sauvaud, J.-A., Thocaven, J.-J., Moreau, T., Winningham, D., Frahm, R., Scherrer, J., Sharber, J., Wurz, P. & Bochsler, P., [ASPERA-3: Analyzer of space plasmas and energetic ions for Mars Express](#), ESA SP-1240, 121-139, 2004.

Hilti, N., SAUNDERS, M.A. & LLOYD-HUGHES, B., Business application of seasonal hurricane forecasts in property catastrophe reinsurance, *Global Reinsurance*, 6-7, 2004.

LEA, A.S. & SAUNDERS, M.A., [June forecast update for Northwest Pacific typhoon activity in 2004](#), 2pp, 2004.

LEA, A.S. & SAUNDERS, M.A., [July forecast update for Northwest Pacific typhoon activity in 2004](#), 2pp, 2004.

LEA, A.S. & SAUNDERS, M.A., [August forecast update for Northwest Pacific typhoon activity in 2004](#), 2pp, 2004.

LEA, A.S. & SAUNDERS, M.A., [June forecast update for Australian region tropical storm activity in 2004/5](#), 3pp, 2004.

LEA, A.S. & SAUNDERS, M.A., [July forecast update for Australian region tropical storm activity in 2004/5](#), 3pp, 2004.

LEA, A.S. & SAUNDERS, M.A., [August forecast update for Australian region tropical storm activity in 2004/5](#), 3pp, 2004.

Nykyri, K., Cargill, P.J., Lucek, E., Holmby, T., Lavraud, B., Balogh, A., Dunlop, M.W., BOGDANOVA, Y., FAZAKERLEY, A., Dandouras, I. & Reme, H., [Cluster observations of magnetic field fluctuations in the high-altitude cusp](#), *Ann. Geophysicae*, 22, 2413-2429, 2004.

SAUNDERS, M.A. & LEA, A.S., [June forecast update for Atlantic hurricane activity in 2004](#), 4pp, 2004.

SAUNDERS, M.A. & LEA, A.S., [July forecast update for Atlantic hurricane activity in 2004](#), 4pp, 2004.

SAUNDERS, M.A. & LEA, A.S., [August forecast update for Atlantic hurricane activity in 2004](#), 4pp, 2004.

### **B. In Press**

COATES, A.J., Our solar system, *Advances in Astronomy: from Big Bang to the Solar System*, Vol. 1, 2004.

### **PhDs Awarded**

Paul Taylor (CPOM) has recently been awarded his PhD, entitled "Mathematical modelling the formation and evolution of melt ponds on sea ice". The PhD developed a novel method for simulating melt ponds on the surface of sea ice. Melt ponds occur on the surface of Arctic sea ice and are an important contributor to the annual heat and mass balance of the Arctic Ocean.

Paul is continuing at CPOM and is currently working on the development of a geophysical scale sea ice rheology.

### **Invited Talks and Lectures (National and International)**

*Graziella Branduardi -*

- Invited lecture on 'Space Astronomy and XMM-Newton' at the London International Youth Science Forum on 6 August 2004.

*Andrew Coates -*

- Talk 'Giotto observations and interpretation of particle and field interactions' at London Titan Seminar Series, 7 June 2004.
- Keynote talk at opening of 'Space detectives' Antenna exhibition at Science Museum, 29 June 2004.
- Talk (plenary) for LIYSF on 'Exploring the solar system', 30 July 2004.
- Talks for Space School UK on Exploring the solar system – from UCL, 4 August 2004.

*Andrew Fazakerley -*

- Sampling a coronal mass ejection at the Sun and near the earth (solicited), COSPAR 2004, July 18-25 2004, Paris, France.
- First Results From Double Star PEACE, A N Fazakerley, C J Owen, E Lucek, C M Carr presented at 2004 Western Pacific Geophysics meeting, Honolulu, Hawaii, 16-20 August 2004.

*Silvia Zane -*

- 'XMM-Newton Observations of Her X-1' presented at the meeting on "Interacting Binaries: Probing Accretion, Evolution and Outcome", Cefalu, Italy, July 2004 (Zane, Ramsay et al).



- ‘Thermal Emission From Isolated Neutron Stars and their Surface Magnetic Field: going quadrupolar?’ at the 35th Cospar Symposium, Paris, July 2004, parallel session E1.4 : ‘Young Neutron Stars and Supernova Remnants’.

### **Conference and Workshop Presentations (National and International)**

SORIA, R., 5th Microquasar Workshop, Tsinghua University, Beijing, June 2004.

COATES, A.J., Rymer, A.M., McAndrews, H.J., Linder, D.R., Grande, M., Svenes, K., Narheim, B.T., Thomsen, M.F., Sittler, E., Young, D.T., [THE CAPS TEAM](#)  
First results from Saturn: CAPS electron spectrometer

MARCHAUDON, A., Bogdanova, Y.V., Dunlop, M., Davies, J., Milan, S., Cargill, P., Lahiff, A.D., Fazakerley, A.N., Owen, C.J., Klecker, B., and Reme, H., Conjunction between magnetospheric FTEs observed by Cluster and PIFs observed by SuperDARN, 2004 Cluster Ground-Based workshop, University of Leicester, 23-25 June 2004.

BOGDANOVA, Y.V., A. Marchaudon, M. Dunlop, P. Cargill, J. Davies, S. Milan, A.D. Lahiff, A.N. Fazakerley, C.J. Owen, B. Klecker, H. Reme, Conjunction between the stagnant exterior cusp and the ionosphere, 2004 Cluster Ground-Based workshop, University of Leicester, 23-25 June 2004.

BOGDANOVA, Y.V., Fazakerley, A.N., Owen, C.J., Lahiff, A.D., Klecker, B., Reme, H. and Bosqued, J.M., Mid-altitude cusp observations by 4 Cluster spacecraft under different IMF conditions, COSPAR 2004, July 18-25 2004, Paris, France.

BOGDANOVA, Y.V., Fazakerley, A.N., Owen, C.J., Lahiff, A.D., Klecker, B., Reme, H., Bosqued, J.M., Cargill, P., Balogh, A., Andre, M., Sundkvist, D., Cornilleau-Wehrlin, N., Canu, P. and Decreau, P., Statistical study of the electron-only mid-altitude cleft region: Cluster observations, COSPAR 2004, July 18-25 2004, Paris, France.

Slavin, J.; Tanskanen, E.; OWEN, C.; Dunlop, M.; Lucek, E.; Balogh, A.; Glassmeier, K. Cluster Observations of TCRs and Rarefaction Wave Fronts in the Lobes of the Near-Tail, COSPAR 2004, July 18-25 2004, Paris, France.

### **Press Releases**

- Tropical Storm Risk Wins London Market Innovation of the Year Award 2004. 8<sup>th</sup> July 2004 (Mark Saunders). [http://forecast.mssl.ucl.ac.uk/shadow/docs/TSR\\_BIA\\_Award2004.pdf](http://forecast.mssl.ucl.ac.uk/shadow/docs/TSR_BIA_Award2004.pdf).
- Application of Seasonal Hurricane Forecasts for Catastrophe Reinsurance Announced, 21<sup>st</sup> July 2004 (Mark Saunders). [http://forecast.mssl.ucl.ac.uk/shadow/docs/072104TSR\\_BusinessApplicati.pdf](http://forecast.mssl.ucl.ac.uk/shadow/docs/072104TSR_BusinessApplicati.pdf).
- Even More Active 2004 Atlantic Hurricane Season Predicted by TSR Consortium, 6<sup>th</sup> August 2004 (Mark Saunders). <http://forecast.mssl.ucl.ac.uk/shadow/docs/TSRAtlRelease06082004.pdf>
- TSR Predicts Hurricane Season Has More to Come, 20<sup>th</sup> August 2004 (Mark Saunders). <http://forecast.mssl.ucl.ac.uk/shadow/docs/TSRRelease200804.pdf> .
- PPARC press conference (AJC talk – Cassini-Huygens overview), 3 June 2004.



## **Media Broadcasts and Features**

Andrew Coates - Over 35 international, national and local interviews including:

- Venus Express and transits for BBC R4 Today programme, BBC R5, BBC News online, 5 June 2004
- Cassini for BBC R4 PM, Independent, Times, New Scientist, News 24, Sky News, Nature Science Update, Telegraph, Guardian, Scotsman, BBC News Online, BBC World Service (Science in Action, Newshour), Jun -July 04
- Messenger launch Channel 4 news, BBC World Service (Newshour, World Today), Sky News, July-Aug 2004
- Extrasolar planets BBC R1 Newsbeat, 2 July 2004
- Beagle and Mars exploration ITN C5 news, 24 August 2004

## **Other News Items/Activities**

The TSR (Tropical Storm Risk) web site received over 60,000 hits between 1<sup>st</sup> June and 31<sup>st</sup> August (a 200% rise on the same period in 2003).

Venus Transit - Forty secondary school children were invited to MSSL on 8 June. They were able to view the transit using a number of safe techniques, the simplest being the use of solar eclipse goggles for direct viewing. Three tracking telescopes were also set up. The first had a solar filter, which allowed direct viewing of the transit with high magnification; the second had an image of the Sun projected onto a sheet of white paper and the third had a networked web camera at the telescope eyepiece with streaming images viewable over the laboratory LAN.

Venus Transit (Eddington) - In view of the relevance of the Venus transit to the Eddington mission (designed to detect planets around other stars by their transits), and the fact that MSSL has one of the few Eddington prototype CCDs, it was decided to try to use the Eddington CCD to image the transit. A heliostat was built (sun-tracking mirror with optics) to focus the sun's image on to the CCD in its cryostat. Derek Burns, Andy Fenney and Dave Walton took the equipment to CAB/INTA in Madrid, our colleagues for Eddington. Unfortunately, on the day of the transit, technical problems prevented any data being obtained but subsequent tests showed that the instrument works and could be re-used in the future.

Mat Page and Roberto Soria took part in the Chandra Peer Review Panel Meeting in Boston, June 2004.

Chris Copperwheat and Yasir Soobiah visited Gleblands School, Cranleigh. They gave a talk and demonstration on Comets and Impact Craters.

City & Islington College visited UCL on 25/6/04. Andrew Coates talked on the Solar System and recent mission results; Tracey Poole provided a Solar System workshop using the Celestia package.

### **Acknowledgements**

Andrew Coates would like to thank everyone involved in:-

- Double Star – successful launch and commissioning.
- Cassini – highly successful first ‘taste’ of Saturn’s magnetosphere. Software and processing of data for COSPAR and team meeting.
- London International Youth Science Forum, 3 August.

### **Next Issue**

The next issue of the Department of Space and Climate Physics Newsletter (Volume 2, Issue 3) will be published in mid-December 2004. This will cover activities from 1st September 2004 to 30th November 2004.