ROYAL ASTRONOMICAL SOCIETY

Meeting Notes:
10 January 2020

RAS Specialist Discussion Meeting

Radiation Hydrodynamics: Implementation and Application

10.00–15:30 in the Geological Society Lecture Theatre, Burlington House, Piccadilly, London W1J 0BG

Organisers: Kenny Wood (St Andrews)
Tim Harries (Exeter)

RAS Specialist Discussion Meeting

Radiation belt modelling in the post Van Allen Probes era

10:30–15:30 in the Royal Astronomical Society Lecture Theatre, Burlington House, Piccadilly, London W1J 0BQ

Organisers: Oliver Allanson (Reading)
Sarah Bentley (Reading)
Ravindra Desai (Imperial College)
Johnathan Ross (British Antartic Survey)

Open (Monthly A & G meeting)

16:00 - 17:00 Dr. Allan Chapman, Wadham College, Oxford University
"Ancestors and Descendants: The RAS and the Origins of the British Learned Society, 200 years on"

17:00 - 17:30 Prof. Anton Ziolkowski, University of Edinburgh
"Understanding the physics of Planet Earth"

17:30 - 18:00 Dr. Megan Argo, University of Central Lancashire
"The next blink of a cosmic eye: Astronomy in the next 200 years

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Admission fees:

Admission to Specialist Discussion Meetings is free to RAS Fellows, £15 to non-fellows (£5 to students), cash or cheque only, collected at the door. Admission to the subsequent Open (Monthly A&G) Meeting of the Royal Astronomical Society is open to all, at no charge. For more information see www.ras.ac.uk

RAS Specialist Discussion Meeting

Radiation Hydrodynamics: Implementation and Application

10:00 -15:30 in the Geological Society Lecture Theatre, Burlington House, Piccadilly, London W1J 0BG

Organisers: Kenny Wood (St Andrews)
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Summary: The complex interplay between matter and radiation is a fundamental driver of structure in the Universe at all scales, from the formation of stars and galaxies to the circulation of exoplanet atmospheres. Analytical approaches cannot capture the intricacy of these phenomena, and consequently we rely on numerical simulations to inform our understanding. Although hydrodynamical schemes, using both grid-based and particle approaches, have reached a high-level of sophistication, the incorporation of radiation effects has proven to be extremely challenging. Difficulties arise due to the non-local effects of radiation, and also that detailed microphysical processes may need to be included. Overcoming these obstacles requires a combination of clever numerical approaches and state-of-the-art computer science.

Happily we are now entering a golden era of radiation-hydrodynamical (RHD) simulations across the breadth of astronomy. In part this is due to increasing access to large-scale distributed high-performance computing, but it is also due to the implementation of novel radiation solvers into established, publicly accessible hydro codes.

10:00-10:30 Registration & Coffee

Morning Session (10.10 – 13.05) Chaired by Antonia Bevan

10.10-10.15	Intro from Kenny Wood
10.15-10.40	**Anna Rosen** Invited
	Modeling Radiative Feedback and in Massive Star Formation
10.40-10.55	**Elliot Avache**
	Gamma-ray bursts
10.55-11.10	**Andreas Sander**
	Stellar atmospheres
11.10-11.25	**Roger Dufrense**
	Stellar transition regions
11.25-11.40	**Duncan Christie**
	Ionised outflows from exoplanet atmospheres
11.40-11.50	Short break & discussions
11.50-12.05	**James Owen**
	Exoplanets
12.05-12.20	**Helene Bloch**
	Theoretical radiation transfer
12.20-12.35	**Jonathan Mackey**
	Wolf Rayet nebulae
12.35-12.50	**Bert Vandenbroucke**
	RHD for diffuse ionised gas
12.50-13.05	**Nick Higginbottom**

Radiatively driven accretion disk winds

13.05-13.50 **Lunch**

Afternoon session (13.50-15.30) Chaired by Tom Haworth

13.50-14.15 **Rolf Kuiper** - invited

14.15-14.30 **Raphael Mignon-Risse**

Massive star formation

14.30-14.45 **Tom Bending**

Photoionization feedback in Giant Molecular Clouds

14.45-15.00 **Margherita Molaro**

Epoch of reionisation

15.00-15.15 **Luke Conaboy**

Cosmological reionisation

15.15-15.30 **Nina Sartorio**

Cosmological radiation hydrodynamics

15.30 - 16.00 **Tea** will be available in the Lower Library of the Geological Society for those attending the Open (Monthly A&G) Meeting of the Royal Astronomical Society

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Suggested hashtag:

16.00 Open (Monthly A&G) Meeting

Admission fees:

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RAS Specialist Discussion Meeting

Radiation belt modelling in the post Van Allen Probes era

10:30–15:30 in the Royal Astronomical Society Lecture Theatre, Burlington House, Piccadilly, London W1J 0BQ

Organisers: Oliver Allanson (Reading)
Sarah Bentley (Reading)
Ravindra Desai (Imperial College)
Johnathan Ross (British Antartic Survey)

Summary: NASA's Van Allen Probes (VAP) are the most comprehensive in-situ measurements ever taken in the near-Earth space radiation environment. However, the VAP are scheduled for science decommission in early 2020, and our need for high quality radiation belt models is only likely to increase in the future. This is the optimum time for the academic community and industry partners to come together, in order to capture our progress and plan future strategy.

In this meeting we aim to consolidate key advances made during the VAP era, on topics ranging from: the underlying theory of wave particle interactions; the relative role of different plasma waves on electron acceleration and transport; complex and system-scale dynamics, including the effect of solar wind driving and substorm activity on particle fluxes; how prediction of particle sources and losses have improved, and can be addressed by VAP data. Further, we aim to plan future directions for radiation belt modelling and interactions between the space weather community, industry stakeholders and the wider public. For example, what are the remaining science and engineering questions? What do we believe are the missing components of radiation belt models? How can the valuable resource of VAP data be used to address the issues above, and how can existing and planned missions (e.g. ARASE) be used to support and extend existing capability?

10:00 – 10:30 **Registration & Coffee**

Morning Session (10.30 – 12.20) Chaired by Oliver Allanson

10:25-10.30 Welcome to the meeting

10:30-10.55 **Yuri Shprits** (Invited)
Unusual Behavior of the Ultra-relativistic Electron Radiations Belts Relieved by Van Allen Probes Observations

10.55-11.20 **Ewan Haggerty** (Invited)
Developing a Space Weather Exercise Generation Toolkit

11.20-11.35 **Richard Horne**
Turning radiation belt science into forecasting

11.35-11.50 **Hayley Allison**
Chorus Wave Interactions with Ultra-relativistic Electrons: the Importance of Electron Density

11.50-12.05 **Dedong Wang**
Controlling Effect of Wave Models and Plasma Boundaries on the Dynamic Evolution of Relativistic Radiation Belt Electrons

12.05-12.20 **Colin Forsyth**
Forecasting GOES 15 >2 MeV electron fluxes from solar wind data and geomagnetic indices

12.20-12.35 **Clare Watt**
Stochastic parameterizations in terrestrial radiation belt diffusion models

12.35-14.00 **Lunch**

Posters (Library) Session 2: Chaired by Johnathan Ross

Afternoon Session (14.00-15.30)

14.00-14.25 **Lauren Blum (Invited)**
Investigating the dynamics and loss of Earth's outer radiation belt through multipoint measurements

14.25-14.40 **Anthony Chan**
Comprehensive Radiation Belt Simulations in the Post Van Allen Probes Era

14.40-14.55 **Johnathan Rae**
What do we need to know to model radial diffusion?

14.55-15.10 **Jasmine Sandhu**
Storm-time ULF waves: How important are they for radial diffusion?

15.10-15.25 **Sarah Bentley**
ULF wave power distributions and their upper bounds at the ground and in the magnetosphere

15:30 – 16:00 **Tea** will be available in the Lower Library of the Geological Society for those attending the Open (Monthly A&G) Meeting of the Royal Astronomical Society

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Suggested hashtag: #postvanallen

16:00 Open (Monthly A&G) Meeting

Notes for Fellows of the Society

1. ADMISSION FEES

Admission to the Open (Monthly A&G) Meeting of the RAS is open to all, at no charge. Admission to Specialist Discussion Meetings is free to RAS Fellows, and £15 to non-fellows (£5 to students), cash or cheque only, collected at the door.

3. ATTENDANCE BY GUESTS AT THE MONTHLY A&G (OPEN) MEETING

Guests of the Society (particularly students) who have attended the Specialist Discussion Meeting are most welcome to attend the Open (Monthly A&G) Meeting of the Society, which commences at 16:00 in the Lecture Theatre of the Geological Society. This meeting is open to all, not just RAS members.

4. UPDATES TO MEETING PROGRAMMES

Please refer to the meetings pages at **http://www.ras.ac.uk/** for the most up to

date meetings information.

Code of Conduct

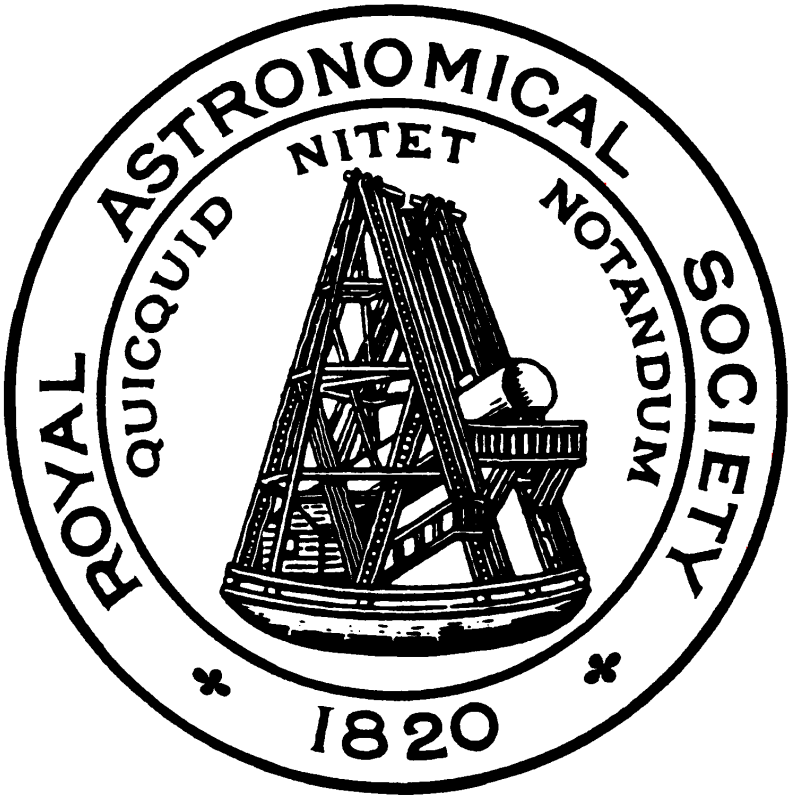
We value the participation of everyone at Royal Astronomical Society events and want all attendees to have an enjoyable and fulfilling experience. Accordingly, all attendees are expected to show respect and courtesy to other attendees and staff.

As such the RAS will be a harassment-free environment for everyone, regardless of gender, sexual orientation, disability, physical appearance, body size, race, nationality, religion. We do not tolerate harassment of attendees in any form.

- Lecturers give their time freely, many have travelled a considerable distance, some are very distinguished, some are early career scientists perhaps giving a lecture at this level for the first time, and all deserve a fair and encouraging hearing. Please try to be on time for the start of a session, or otherwise slip quietly into the lecture theatre, refrain from loud conversations outside the doors and switch off mobile phones, and if you must use a lap-top computer do so inconspicuously in one of the rear seats.
- Harassment includes offensive verbal comments related to gender, sexual orientation, disability, physical appearance, body size, race, religion, sexual images in public spaces, deliberate intimidation, stalking, following, harassing photography or recording, sustained disruption of talks or other events, inappropriate physical contact, and unwelcome sexual attention.
- All communication given by lecturers, organisers and attendees should be appropriate for a professional audience including people of many different backgrounds. Sexual language, jokes and imagery is not appropriate for any event.
- Be kind to others. Do not insult or put down other attendees.
- Respect RAS staff.
- Behave professionally. Remember that harassment and sexist, racist, or exclusionary jokes are not appropriate.

Participants asked to stop any harassing behaviour are expected to comply immediately. Attendees violating these rules may be asked to leave the event, without a refund of any charge that may have been levied.

Thank you for helping make this a welcoming, respectful space for all.



Advancing Astronomy and Geophysics

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