



## Chapman Conference on Particle Dynamics in the Earth's Radiation Belts

### Conveners

**Seth Claudepierre**

The Aerospace Corporation, Los Angeles, CA, USA

**Chris Colpitts**

University of Minnesota, Minneapolis, MN, USA

**Joe Fennell**

The Aerospace Corporation, Los Angeles, CA, USA

**Xinlin Li**

University of Colorado/LASP, Boulder, CO, USA

**Jean-Francois Ripoll**

Commissariat à l'Énergie Atomique, Paris, France

**Sasha Ukhorskiy**

JHU/Applied Physics Laboratory, Laurel, MD, USA

### Program Committee

**Sebastien Bourdarie**

ONERA, France

**Chris Crabtree**

NRL, USA

**Lei Dai**

SKSW, NSSC, China

**Richard Horne**

BAS, United Kingdom

**Junga Hwang**

KASI, South Korea

**Robyn Millan**

Dartmouth College, USA

**Yoshi Miyoshi**

STEL, Japan

**Binbin Ni**

Wuhan University, China

**Yoshiharu Omura**

Kyoto University, Japan

**Viviane Pierrard**

Royal Belgian Institute for Space Aeronomy

**Geoff Reeves**

LANL, USA

**Craig Rodger**

University of Otago, New Zealand

**Ondrej Santolik**

Czech Academy of Science, Czech Republic

**Scott Thaller**

University of Minnesota, USA

# Scientific Program

SUNDAY, MARCH 04

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6:00 p.m.– 7:30 p.m.

## Ice Breaker Reception

Lakehouse

MONDAY, MARCH 05

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8:15 a.m.– 8:30 a.m.

## Welcome and Conference Kick Off

Convener(s): Seth Claudepierre

Longshot and Bogey

8:15 a.m.– 8:30 a.m.

Presented by Sasha Ukhorskiy

8:30 a.m.– 10:00 a.m.

## Particle Acceleration and Transport I

Convener(s): Geoffrey Reeves

Longshot and Bogey

8:30 a.m.– 8:50 a.m.

**Daniel N Baker** | Multi-Year Observations of Ultra-Relativistic Electrons with the Van Allen Probes Mission

8:50 a.m.– 9:05 a.m.

**Nigel Peter Meredith** | Extreme Relativistic Electron Fluxes in the Earth's Outer Radiation Belt: Analysis of INTEGRAL IREM Data

9:05 a.m.– 9:20 a.m.

**Ian Robert Mann** | Explaining the Diverse Response of the Ultra-relativistic Van Allen Radiation Belt to Solar Wind Forcing

9:20 a.m.– 9:40 a.m.

**Zhenpeng Su** | Nonstorm-time acceleration and transport of radiation belt electrons: Physical mechanisms and favored conditions (*Invited*)

9:40 a.m.– 10:00 a.m.

**Mary K Hudson** | Simulated prompt acceleration of multi-MeV electrons by the 7 September 2017 interplanetary shocks (*Invited*)

10:00 a.m.– 10:30 a.m.

## Morning Break

Foyer

10:30 a.m.– 12:00 p.m.

## Particle Acceleration and Transport II

Convener(s): Aleksandr Ukhorskiy

Longshot and Bogey

- 10:30 a.m. –10:50 a.m. **Allison N Jaynes** | The Impressive Correlation Between Substorm Activity and the Rebuilding of Earth’s Radiation Belts (*Invited*)
- 10:50 a.m. –11:10 a.m. **Stavros Dimitrakoudis** | On the Causality of Chorus Wave Acceleration: A Remarkable Correlation Between Storm-time ULF wave Power Profiles and the POES VLF Chorus Wave Proxy
- 11:10 a.m. –11:30 a.m. **Alexander J Boyd** | Peaks in Phase Space Density: A Survey of the Van Allen Probes Era
- 11:30 a.m. –11:45 a.m. **Christos Katsavrias** | Geospace driver effects on electron acceleration and loss in the outer Van Allen belt
- 11:45 a.m. –12:00 p.m. **Kyle R Murphy** | The Anatomy of a Storm
- 12:00 p.m.– 1:30 p.m. **Lunch**  
**Five Pines Restaurant**
- 1:30 p.m.– 3:00 p.m. **Particle Acceleration and Transport III**  
Convener(s): Seth Claudepierre  
Longshot and Bogey
- 1:30 p.m. –1:50 p.m. **Gregory Cunningham** | Neoclassical and anomalous radial diffusion of trapped electrons in the inner belt
- 1:50 p.m. –2:10 p.m. **Hayley Jane Allison** | On the Effect of the Seed Population, a Comparison of Three Low Energy Boundaries in the BAS Radiation Belt Model
- 2:10 p.m. –2:30 p.m. **Robert L Lysak** | Radial Transport due to ULF Field Line Resonances and Cavity Modes in the Inner Magnetosphere
- 2:30 p.m. –2:45 p.m. **Robert Rankin** | Test Particle Simulation of the Pitch Angle Response of Ions to ULF Waves: Van Allen Probes Observations and Formation of Butterfly Distributions
- 2:45 p.m. –3:00 p.m. **Marina Georgiou** | Storm-time Estimates of Radial Diffusion from Ground- and Space-based Measurements
- 3:00 p.m.– 3:30 p.m. **Afternoon Break**  
**Foyer**
- 3:30 p.m.– 5:00 p.m. **Particle Acceleration and Transport IV**  
Convener(s): Joseph Fennell  
Longshot and Bogey

- 3:30 p.m. –3:45 p.m. **Thomas Paul O'Brien III** | Estimating and Validating Diffusion Coefficients with Particle Data
- 3:45 p.m. –4:05 p.m. **Yoshizumi Miyoshi** | Acceleration of outer radiation belt electrons associated with solar wind pressure pulse: MHD-test particle simulation study and Arase and Van Allen Probe observations
- 4:05 p.m. –4:25 p.m. **Shrikanth G Kanekal** | Van Allen Probes observations of radiation belt response to interplanetary shocks and co-rotating interaction region during September 2017
- 4:25 p.m. –4:45 p.m. **Richard Bertram Horne** | Calculation of the Relativistic Electron flux at Geostationary Orbit Due to an Extreme Space Weather Event
- 4:45 p.m. –5:00 p.m. **Scott A Thaller** | Evidence for modulation at the solar rotation period of the convection electric field, plasmaspheric density, ULF wave power, and energetic particles over the Van Allen Probes Mission

## TUESDAY, MARCH 06

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- 8:30 a.m.– 10:00 a.m. **Particle Acceleration and Transport V**  
 Convener(s): Joseph Fennell  
 Longshot and Bogey
- 8:30 a.m. –8:50 a.m. **David Malaspina** | Particle Transport Driving Nonlinear Plasma Waves at Injection Fronts in the Inner Magnetosphere
- 8:50 a.m. –9:05 a.m. **Christopher Carew Chaston** | Radiation belt electron transport and energisation in broadband electromagnetic waves
- 9:05 a.m. –9:25 a.m. **Yuto Katoh** | Simulation study of the nonlinear processes of whistler-mode chorus generation in the Earth's inner magnetosphere (*Invited*)
- 9:25 a.m. –9:45 a.m. **Matina Gkioulidou** | Direct Outflow and Subsequent Transport of Low Energy (<keV) O<sup>+</sup> Ions into the Inner Magnetosphere During Geomagnetically Active Times and Implications for Radiation Belt Dynamics. (*Invited*)
- 9:45 a.m. –10:00 a.m. **Viviane Pierrard** | The dynamics of space radiations as observed by the Energetic Particle Telescope
- 10:00 a.m.– 10:30 a.m. **Morning Break**  
**Foyer**
- 10:30 a.m.– 12:00 p.m. **Particle Acceleration and Transport VI**  
 Convener(s): Scott Thaller

- Longshot and Bogey
- 10:30 a.m. –10:50 a.m. **Xinlin Li** | Recent Advancements on the Sources of Inner Radiation Belt Particles
- 10:50 a.m. –11:10 a.m. **J. F. Fennell** | Energetic Electron Penetration Into Inner Radiation Zone
- 11:10 a.m. –11:30 a.m. **Sebastien A Bourdarie** | Long Term High Energy Electron Dynamics in The Inner Zone
- 11:30 a.m. –11:45 a.m. **Drew L Turner** | Statistics of Sudden Particle Enhancements at Low L-shells and Their Role as a Source of Earth's Inner Electron Radiation Belt
- 11:45 a.m. –12:00 p.m. **Geoffrey D Reeves** | Acceleration, Transport, and Trapping of Ultra-Heavy Ions in the Inner Zone
- 12:00 p.m.– 1:30 p.m. **Lunch**  
**Five Pines Restaurant**
- 1:30 p.m.– 3:00 p.m. **Particle Acceleration and Transport VII**  
Convener(s): Seth Claudepierre  
Longshot and Bogey
- 1:30 p.m. –1:50 p.m. **Peter H Yoon** | Excitation and saturation of electron loss cone by upper-hybrid wave and Z mode instabilities in the Earth's magnetosphere
- 1:50 p.m. –2:05 p.m. **James L Roeder** | Multi-Spacecraft Observations of Whistler-Mode Wave-Particle Interactions: Temporal or Spatial Structures?
- 2:05 p.m. –2:20 p.m. **Satoshi Kurita** | Modulation of electron pitch angle distributions observed by MEP-e onboard the Arase satellite
- 2:20 p.m. –2:40 p.m. **Craig Kletzing** | Chorus Element Properties: Statistics From Automated Chorus Detection
- 2:40 p.m. –3:00 p.m. **J Bernard Blake** | Simultaneous Observation Of A Strong Electron Microburst At The Equator And In the Ionosphere
- 3:00 p.m.– 3:30 p.m. **Afternoon Break**  
**Foyer**
- 3:30 p.m.– 6:30 p.m. **Poster Reception**  
Presiding: Heather Nalley  
Lakehouse

3:30 p.m.– 6:30 p.m.

## Particle Acceleration and Transport VIII Posters

Convener(s): Seth Claudepierre

Lakehouse

- T-1 **Alemayehu Mengesha Cherkos II** | Gravitational instability on propagation of MHD waves in astrophysical plasma
- T-2 **Christos Katsavrias** | Association of Pc4-5 waves with near-equatorial electron fluxes during substorm activity
- T-3 **Frederic Effenberger** | *Modeling the response of the Earth's radiation belts to CME- and CIR-driven geomagnetic storms*
- T-4 **Jaeheung Park** | Spectral structures of high-energy electrons as observed by the Science and Technology Satellite-I (STSAT-1) of Korea
- T-5 **Dedong Wang** | Validation of New Chorus Wave Model derived from Van Allen Probe Wave Observations using VERB-3D code and Particle Measurements
- T-7 **Nana Higashio** | Energy dependence of relativistic electron variations in the outer radiation belt during the recovery phase of magnetic storms: Arase/XEP observations
- T-11 **Sam Bingham** | Van Allen Probe Observations of Chorus Wave Activity, Source and Seed electrons, and the Radiation Belt Response During ICME and CIR Storms
- T-13 **Seth G Claudepierre** | A Revised Look at Relativistic Electrons in the Inner Zone and Slot Region
- T-14 **Ashley Diemer Jones Greeley** | Van Allen Probes observations of electron response to the 2016 October 12-13 IP shock and magnetic cloud
- T-15 **Yoshizumi Miyoshi** | The magnetic field investigation on the Arase (ERG) mission: Overview of initial scientific results
- T-19 **Yan Song** | Generation of Electrostatic Electric Fields and Radiation Belt Particle Acceleration to High Energy

## WEDNESDAY, MARCH 07

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8:30 a.m.– 10:00 a.m.

## Particle Loss I

Convener(s): Jean-Francois Ripoll

Longshot and Bogey

- 8:30 a.m. –8:50 a.m. **Lauren Blum** | Energetic Electron Precipitation and Associated Scattering Processes: Recent Advances and Remaining Questions *(Invited)*
- 8:50 a.m. –9:10 a.m. **Robyn M Millan** | What Have we Learned From BARREL?
- 9:10 a.m. –9:25 a.m. **Aaron W Breneman** | Observations directly linking relativistic electron microbursts to whistler mode chorus: Van Allen Probes and FIREBIRD II
- 9:25 a.m. –9:40 a.m. **Craig J Rodger** | Intensity of relativistic electron microbursts and their impact on the radiation belts
- 9:40 a.m. –10:00 a.m. **Shinji Saito** | Correlation between precipitation and acceleration of relativistic electrons by whistler mode chorus waves: GEMSIS-RBW simulations *(Invited)*
- 10:00 a.m.– 10:30 a.m. **Morning Break**  
**Foyer**
- 10:30 a.m.– 12:00 p.m. **Particle Loss II**  
Convener(s): Chris Colpitts  
Longshot and Bogey
- 10:30 a.m. –10:50 a.m. **Craig J. Rodger** | Outstanding questions around the energy of EMIC wave driven electron precipitation
- 10:50 a.m. –11:10 a.m. **Maria Usanova** | Long-term correlation of EMIC wave activity and radiation belt flux variations *(Invited)*
- 11:10 a.m. –11:30 a.m. **Yuri Shprits** | Loss of Relativistic and Ultra-relativistic Electrons From the Radiation Belts
- 11:30 a.m. –11:45 a.m. **David Hartley** | Observations of Oblique Plasmaspheric Hiss from Van Allen Probes
- 12:00 p.m.– 1:30 p.m. **Lunch**  
**Five Pines Restaurant**

## THURSDAY, MARCH 08

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- 8:30 a.m.– 10:00 a.m. **Particle Loss III**  
Convener(s): Robyn Millan  
Longshot and Bogey

- 8:30 a.m. –8:50 a.m. **Hilde Nesse Tyssøy** | Radiation Belt Loss due to Energetic Electron Precipitation in Geomagnetic Storm associated with Corotating Interaction Regions (*Invited*)
- 8:50 a.m. – 9:10 a.m. **Ligia Alves Da Silva** | Dynamic mechanisms of rapid dropout in the outer radiation belt observed after the Coronal Mass Ejection associated with Shock in July 2016
- 9:10 a.m. –9:30 a.m. **Leonid Olifer** | On Diffusive and Non-Diffusive Fast ULF Wave Radiation Belt Losses during Intense Geomagnetic Storms
- 9:30 a.m. –9:45 a.m. **Alexander W Degeling** | Direct Modulation of Electron Precipitation by ULF waves
- 9:45 a.m. –10:00 a.m. **Ivan Pakhotin** | Diagnosing the Causes of Extremely Fast Loss from the Radiation Belts: High Cadence Swarm and GPS Satellite Monitoring
- 10:00 a.m.– 10:30 a.m. **Morning Break**  
**Foyer**
- 10:30 a.m.– 12:00 p.m. **Particle Loss IV**  
Convener(s): Craig Rodger  
Longshot and Bogey
- 10:30 a.m. –10:50 a.m. **Harlan E. Spence** | Quantifying Properties and Atmospheric Consequences of Medium Energy Relativistic Electron Precipitation from the Radiation Belts: Coordinated Studies Using FIREBIRD and Van Allen Probes Measurements and Whole Atmosphere Modeling
- 10:50 a.m. –11:10 a.m. **Robert Andrew Marshall** | Atmospheric Signatures of Radiation Belt Precipitation and their Relationship to Precipitating Flux and Spectra
- 11:10 a.m. –11:30 a.m. **Alexa Jean Halford** | The storm that wasn't: A look at multiple loss processes occurring simultaneously and how they interact with each other.
- 11:30 a.m. –11:45 a.m. **Colin Forsyth** | Increases and decreases in radiation belt electron content with geomagnetic activity
- 11:45 a.m. –12:00 p.m. **Angelica Sicard** | Validation of the Physical Model Salammbô- Protons with Van Allen Probes Data
- 12:00 p.m.– 1:30 p.m. **Lunch**  
**Five Pines Restaurant**



- 1:30 p.m.– 3:00 p.m. **Laboratory Plasma Experiments and The Role of Nonlinear Processes**  
Convener(s): Aleksandr Ukhorskiy  
Longshot and Bogey
- 1:30 p.m. –1:50 p.m. **Chris E Crabtree** | An Analytical and Data-Driven Approach to Self-Consistent Nonlinear Wave-Particle Interactions
- 1:50 p.m. –2:10 p.m. **Erik M Tejero** | Laboratory Investigation of Nonlinear Whistler Wave Processes (*Invited*)
- 2:10 p.m. –2:25 p.m. **Gurudas Ganguli** | Kinetic Equilibrium of Dipolarization Fronts
- 2:25 p.m. –2:45 p.m. **Troy A Carter** | Overview of the Basic Plasma Science Facility (*Invited*)
- 3:00 p.m.– 3:30 p.m. **Afternoon Break**  
**Foyer**
- 3:30 p.m.– 6:30 p.m. **Poster Reception**  
Presiding: Heather Nalley  
Lakehouse
- 3:30 p.m.– 6:30 p.m. **Particle Loss V Posters**  
Convener(s): Jean-Francois Ripoll  
Lakehouse
- H-1 **Chris A Colpitts** | Analysis of data from a series of Van Allen Probes and ARASE satellite conjunctions to determine the spatial scale of magnetospheric wave modes and their effects on radiation belt particles
- H-2 **Jonathan Rae** | Testing the theory behind ULF pulsation-related precipitation
- H-4 **Richard Eugene Denton** | Wave fields of electromagnetic ion cyclotron and whistler waves in a two dimensional dipole magnetosphere and associated particle acceleration and pitch angle scattering
- H-5 **Sneha A Gokani** | What fraction of the outer radiation belt electron flux was lost to the atmosphere during the dropout event on the St Patrick's Day storm of 2015?
- H-6 **Takefumi Mitani** | Lifetime of Relativistic Electrons in the Radiation Belt observed with the HEP Instruments onboard Arase

- H-7 **Reinhard H Friedel** | Magnetopause signatures in LANL geosynchronous satellite energetic particle pitch angle distribution
- 3:30 p.m.– 6:30 p.m. **The Role of Nonlinear Processes I Posters**  
Convener(s): Yoshiharu Omura  
Lakehouse
- H-9 **Masafumi Shoji** | Ion hole formation and nonlinear generation of Electromagnetic Ion Cyclotron waves: THEMIS observations
- H-11 **Nicole Echterling** | Wave-Particle Interactions in Earth’s Radiation Belts: A Model Study of Correlated Electron Bursts and Whistler Chorus
- 3:30 p.m.– 6:30 p.m. **New Radiation Belt Modeling Capabilities and the Quantification of Model Uncertainties Posters**  
Convener(s): Xinlin Li  
Lakehouse
- H-14 **Geoffrey D Reeves** | Untangling solar wind drivers of the outer radiation belt with information theory
- H-16 **Vyacheslav A. Pilipenko** | The Index for the Parameterization of the Magnetospheric ULF Wave Activity
- H-17 **Graciela Lopez Rosson** | Analysis of electron spectra observed by EPT/PROBA-V in the outer radiation belt during geomagnetically quiet and active intervals
- H-18 **Hideki Koshiishi** | Structural Variations of Earth’s Inner Radiation Belt with Solar Cycle
- H-19 **Dmitri A Kondrashov** | Data-adaptive harmonic stochastic modeling of radiation belts
- H-20 **Vivien Loridan** | Quantifying the influence of the magnetic field on the radiation belts during storm-recovery
- 7:00 p.m.– 9:00 p.m. **Conference Banquet**  
**Five Pines Restaurant**

## FRIDAY, MARCH 09

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- 8:30 a.m.– 10:00 a.m. **The Role of Nonlinear Processes II**  
Convener(s): Yoshiharu Omura

Longshot and Bogey

- 8:30 a.m. –8:50 a.m. **Peter A Damiano** | Electron trapping in kinetic scale field line resonances
- 8:50 a.m. –9:10 a.m. **Lunjin Chen** | Nonlinear bounce resonance interaction between equatorial noises and equatorially mirroring electrons in the magnetosphere (*Invited*)
- 9:10 a.m. –9:25 a.m. **Oliver Allanson** | Particle-in-cell simulations of diffusion due to whistler mode waves: comparing quasi-monochromatic to broadband waves
- 9:25 a.m. –9:40 a.m. **Oleksiy V Agapitov** | Nonlinear Wave-Particles Interactions in the Outer Radiation Belt: Mechanisms of Interaction and Effects for the Global Particles Dynamics
- 9:40 a.m. –10:00 a.m. **Junga Hwang** | Roles of upper-hybrid waves on the particle dynamics in the Earth's radiation belt
- 10:00 a.m.– 10:30 a.m. **Morning Break**  
**Foyer**
- 10:30 a.m.– 12:00 p.m. **The Role of Nonlinear Processes and New Radiation Belt Modeling Capabilities and the Quantification of Model Uncertainties**  
Convener(s): Richard Horne  
Longshot and Bogey
- 10:30 a.m. –10:50 a.m. **Aleksandr Y Ukhorskiy** | Particle Trapping and Acceleration at Dipolarization Fronts: High-Resolution MHD and Test-Particle Simulations
- 10:50 a.m. –11:10 a.m. **Yoshiharu Omura** | Formation Process of the Outer Radiation Belt Through Nonlinear Interaction with Chorus Emissions Localized in Longitude
- 11:10 a.m. –11:25 a.m. **John C Foster** | Quantifying the Effect of Strong Subpacket Structure in VLF Chorus Rising Tones on Radiation Belt Acceleration
- 11:25 a.m. –11:45 a.m. **Louis Ozeke** | Identifying the Cause of Outer Radiation Belt Enhancements: The Importance of Accounting for the K-Dependence of and uncertainties in the Electron Phase Space Density. (*Invited*)
- 11:45 a.m. –12:00 p.m. **Jay Albert** | Simulating Butterfly Pitch Angle Distributions in the Inner Zone: Sensitivity to Wave Models

- 12:00 p.m.– 1:30 p.m.      **Lunch**  
**Five Pines Restaurant**
- 1:30 p.m.– 3:00 p.m.      **New Radiation Belt Modeling Capabilities and Quantification of Model Uncertainties I**  
Convener(s): Xinlin Li, Viviane Pierrard  
Longshot and Bogey
- 1:30 p.m. –1:50 p.m.      **Weichao Tu |** Modeling the Magnetopause Shadowing and Drift Orbit Bifurcation Loss during the June 2015 Dropout Event (*Invited*)
- 1:50 p.m. –2:10 p.m.      **Clare Watt |** The Parameterization of Wave-Particle Interactions in the Outer Radiation Belt
- 2:10 p.m. –2:25 p.m.      **Kareem Sorathia |** Global Radiation Belt Modeling: Combined MHD and Test-Particle Simulations
- 2:25 p.m. –2:40 p.m.      **Scot Richard Elkington |** Global Simulations of Wave/Particle Interactions in the Radiation Belts
- 2:40 p.m. –3:00 p.m.      **Sarah Bentley |** A solar wind-parameterised, probabilistic model of ULF waves in Earth’s magnetosphere
- 3:00 p.m.– 3:30 p.m.      **Afternoon Break**  
Foyer
- 3:30 p.m.– 5:00 p.m.      **New Radiation Belt Modeling Capabilities and Quantification of Model Uncertainties II**  
Convener(s): Junga Hwang, Binbin Ni  
Longshot and Bogey
- 3:30 p.m. –3:50 p.m.      **Sarah A Glauert |** Validating Very Long-term Simulations With The BAS Radiation Belt Model Using GIOVE-B Data (*Invited*)
- 3:50 p.m. –4:05 p.m.      **Adam C Kellerman |** Quantification of the Error in Radiation Belt Electron PSD due to Global Field Model Errors
- 4:05 p.m. –4:20 p.m.      **Vincent Maget |** How representative are Van Allen Probes results from extreme events point of view?
- 4:20 p.m. –4:40 p.m.      **Jean-Francois Ripoll |** Computations and observations of the slot formation during quiet storm recovery