Logistics

- SCTC2022 will use the Webex teleconference software, links will be e-mailed to registered participants the week before the conference.
  - Webex can be used through a browser mode or a (free) install of the Webex application on your computer when you first attempt to connect.
  - Microphones and cameras will be enabled for speakers, session chairs, and conveners. All other participants will have microphones and cameras disabled to reduce bandwidth required for the conference and background noise from unmuted microphones.
  - Participants will ask questions using the Webex “chat” feature or the provided Slack channels. Slack channel links are provided in the table below and online at https://sctc2022.exordo.com/programme in the session description.
  - Webex will be started 30 minutes before the workshop each day to allow users to call in before the start of the conference.
  - Session chairs please do not use “unmute all”.

- The Webex links will be e-mailed to registered participants the week before the conference.

- All presentations will be live at the times scheduled on the agenda. There are no pre-recorded presentations.

- We are looking into daily recording of the conference to be posted for 24 hours in case there was a talk or session that was missed. Details will be discussed in the opening remarks.

- Times in the agenda are US Central Daylight Time (CDT) zone (UTC – 5 hours)

- Please upload your presentation (in PowerPoint or PDF format) to the ExOrdo conference site the week before your talk. The Ex Ordo URL is: https://sctc2022.exordo.com

- Upload the final conference paper to ExOrdo the week of the conference, but no later than May 1, 2022.

- Additional information about the special issue of IEEE Transactions on Plasma Science will be provided during the conference. Submitting a paper is voluntary and not required to participate in the workshop.

- Poster Session: Instructions for conference participants to join the Wednesday poster session will be given during the Poster Lightning Session on Tuesday.
Welcome to SCTC 2022!

Well, it has been a long road getting to the conference this week: two postponements and a format change from “in person” to virtual. Thank you for sticking with us!

As the conveners for this year’s conference, we welcome all of you to the 16th Spacecraft Charging Technology Conference (SCTC) 2022! The world is beginning to emerge from the restrictions on travel and in-person meetings that were a result of the Covid pandemic but many professional conferences, including the SCTC2022 this year, are still being held in a virtual format. Regardless, we are greatly encouraged by the strong international response to SCTC from the spacecraft charging community this year in terms of the many excellent contributed abstracts and tutorial that make up the oral and poster presentations.

Welcome to SCTC 2022 and enjoy the conference!

SCTC 2022 Conveners
  Linda Neergaard Parker/Space Weather Solutions
  Joseph Minow/NASA
## Week at a Glance

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<thead>
<tr>
<th>US Central</th>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00:00 AM</td>
<td>SCTC2022 Welcome</td>
<td>5. Posters Lightening Round</td>
<td>10. Online Posters</td>
<td>14. Charging and Arcing Mitigation</td>
<td>18. Charging and Arcing Mitigation</td>
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<tr>
<td>10:20:00 AM</td>
<td>Japan Overview</td>
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<tr>
<td>10:40:00 AM</td>
<td>1. Modeling</td>
<td>6. Solar Array Plasma Interactions</td>
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<tr>
<td>11:00:00 AM</td>
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<td>3. Ground Testing</td>
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<td>4. Ground Testing</td>
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<td>1:00:00 PM</td>
<td>Break</td>
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<td>Break</td>
<td>Closing Remarks and SCTC2024 announcement</td>
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<td>1:20:00 PM</td>
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<td>6. Solar Array Plasma Interactions</td>
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<td>2:00:00 PM</td>
<td>7. Lunar Charging</td>
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<td>8. Modeling</td>
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<td>9. Ground Testing</td>
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<td>3:20:00 PM</td>
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<td>3:40:00 PM</td>
<td>10. Online Poster Session</td>
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<tr>
<td>4:00:00 PM</td>
<td>11. On Orbit Investigations</td>
<td>10:20:00 PM</td>
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<tr>
<td>4:20:00 PM</td>
<td>12. Internal Charging</td>
<td>11:20:00 PM</td>
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<tr>
<td>4:40:00 PM</td>
<td>13. Environments</td>
<td>12:20:00 PM</td>
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<td>5:00:00 PM</td>
<td>14. Charging and Arcing Mitigation</td>
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<td>15. Modeling</td>
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<td>16. Ground Testing</td>
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<td>6:20:00 PM</td>
<td>17. Surface Charging</td>
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<td>7:20:00 PM</td>
<td>19. Ground Testing</td>
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### Slack channel links

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<td>Session</td>
<td>Chaired by</td>
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<tr>
<td>10am</td>
<td><strong>SCTC2022 Welcome</strong></td>
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<tr>
<td>10:20am</td>
<td><strong>Country Overview</strong></td>
<td>Dr. Joseph Minow</td>
</tr>
<tr>
<td>10:40am</td>
<td><strong>1. Modeling</strong></td>
<td>Dr. Pierre Sarrailh and Dr. Victoria A. Davis</td>
</tr>
<tr>
<td>11am</td>
<td><strong>A Comparative Analysis of Differential Charging for Triple Junction of Space-grade Materials in Single and Double Maxwellian Plasma Models</strong></td>
<td>Prof. Ashish Pandya (DHARMSINH DESAI UNIVERSITY), Dr. Nikhil Kothari (DHARMSINH DESAI UNIVERSITY), Dr. Rizwan Alad (DHARMSINH DESAI UNIVERSITY), Dr. Rashmi Joshi (DHARMSINH DESAI UNIVERSITY), Dr. Suryakant Gupta (FCIPT, Institute of Plasma Research, Ahmedabad)</td>
</tr>
<tr>
<td>11:20am</td>
<td><strong>Closing the Gap I: Analytical Methods to Predict the Electrical Effects of Spacecraft Discharge</strong></td>
<td>Michael Bodeau (Consultant), Mrs. Nina Altshuler (Northrop Grumman)</td>
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<tr>
<td>11:40am</td>
<td><strong>Break</strong></td>
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<tr>
<td>12pm</td>
<td><strong>2. Plasma Propulsion and Tethers</strong></td>
<td>Dr. David Cooke and Mr. Dave Pitchford</td>
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<tr>
<td>12:20pm</td>
<td><strong>A Preliminary Investigation into the Operation of a Pulsed Plasma Thruster Powered by Spacecraft Charging</strong></td>
<td>Mr. Kofi Blake (Stanford University), Dr. Nicolas Lee (Stanford University), Prof. Sigrid Close (Stanford University)</td>
</tr>
<tr>
<td>12:40pm</td>
<td><strong>Investigation of Ionic Electrospray Contamination for Small Satellite Formation</strong></td>
<td>Mr. Jeffrey Asher (University of Southern California), Ms. Olivia Acarregui (University of Southern California), Prof. Joseph Wang (University of Southern California)</td>
</tr>
<tr>
<td>1pm</td>
<td><strong>Lunch/Dinner/Nap</strong></td>
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<tr>
<td>1:40pm</td>
<td><strong>3. Ground Testing</strong></td>
<td>Prof. Kazuhiro Toyoda and Dr. Allen Andersen</td>
</tr>
<tr>
<td>1:40pm</td>
<td><strong>Static Cling - A Mechanical Side-Effect of Dielectric Charging</strong></td>
<td></td>
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### Tuesday, 5 April

**10am**

#### 5. Poster Lightning Round

Chaired by: Dr. Linda Parker

**10:40am**

#### 6. Solar Array Plasma

Chaired by: Dr. Victoria A. Davis and Dr. Boris Vayner

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>10:40am</td>
<td><strong>Physics of Patterns in Spectra of EMI Generated by Arcing on Solar Array Surface</strong></td>
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<tr>
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<td><strong>Dr. Boris Vayner</strong> (HXFive NASA/GRC), Dr. Dale Ferguson (AFRL)</td>
</tr>
<tr>
<td>11am</td>
<td><strong>Investigation of Spacecraft Charging Using SPIS on the Geosynchronous Orbit</strong></td>
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<td><strong>Mr. Arif Armağan Gözü tok</strong> (Istanbul Technical University), Prof. Zer efşan Kay maz (Istanbul Technical University)</td>
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<tr>
<td>11:20am</td>
<td><strong>Flash-Over Propagation Model: Results and User Interface</strong></td>
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<td></td>
<td><strong>Dr. Loanne Monnin</strong> (ONERA), Dr. Sebastien Hess (ONERA), Dr. Pierre Sarraillh (ONERA), Dr. Jean-Francois Roussel (ONERA), Mr. Denis Payan (CNES (The French Space Agency))</td>
</tr>
</tbody>
</table>
### 7. Lunar Charging
Chaired by: Dr. Janet Green and Dr. Sebastien Hess

**12pm**
**Lunar Surface Charging under Space Weather Conditions Derived from the ARTEMIS and OMNI Data**
- Mr. Ziyu Huang (University of Southern California), Prof. Joseph Wang (University of Southern California)

**12:20pm**
**Surface Discharge and Dielectric Breakdown of Spacesuit on Lunar Surface: Implications for Astronaut Safety**
- Prof. Joseph Wang (University of Southern California), Mr. Ziyu Huang (University of Southern California), Mr. Warren Su (University of Southern California)

**12:40pm**
**Predicting and Monitoring the Charging Environment to Support Lunar Missions**
- Dr. Linda Parker (Space Weather Solutions), Dr. Janet Green (Space Hazards Applications, LLC), Mr. Justin Likar (Johns Hopkins University Applied Physics Laboratory), Dr. Drew Turner (Johns Hopkins University Applied Physics Laboratory), Mr. Dave Pitchford (Carrington Space, LLC), Ms. Catherine Keys (Maxar Space LLC)

### 1pm
**Effective Debye Lengths in Representative Cislunar Environment Regions**
- Ms. Kaylee Champion (University of Colorado Boulder), Dr. Hanspeter Schaub (University of Colorado Boulder)

### 1:20pm
**Lunch/Dinner/Nap**

### 2pm
**8. Modeling**
Chaired by: Dr. Myron Mandell and Dr. Jean-Charles Matéo-Vélez

### 2pm
**Surface Charging Risk Evaluation in the Frame of PAGER**
- Dr. Benoît Tezenas du Montcel (Artenum, Toulouse), Mr. Arnaud Trouche (Artenum, Toulouse), Dr. Michael Wutzig (GFZ/Postdam university, Potsdam), Mr. Julien Forest (Artenum, Paris), Prof. Yuri Y. Shprits (GFZ/Postdam university, Potsdam & Institute for Physics and Astronomy/Potsdam university & Department of Earth Planetary and Space Sciences/UCLA, Los Angeles, CA)

**2:20pm**
**Inverse Problem Approach to Spacecraft Charging Simulations**
- Dr. Gian Luca Delzanno (Los Alamos National Laboratory), Dr. Pedro Alberto Resendiz Lira (Los Alamos National Laboratory), Dr. Humberto Godinez (Los Alamos National Laboratory), Dr. Michael Henderson (Los Alamos National Laboratory), Dr. Daniil Svyatsky (Los Alamos National Laboratory), Dr. Brendt Wohlberg (Los Alamos National Laboratory)

**2:40pm**
**Validation of an Inverse Technique for Spacecraft Charging Modeling with Van Allen Probes Data**
- Dr. Pedro Alberto Resendiz Lira (Los Alamos National Laboratory), Dr. Gian Luca Delzanno (Los Alamos National Laboratory), Dr. Michael Henderson (Los Alamos National Laboratory), Dr. Humerto Godinez (Los Alamos National Laboratory), Dr. Daniil Svyatsky (Los Alamos National Laboratory), Dr. Brendt Wohlberg (Los Alamos National Laboratory)

### 3pm
**Break**

### 3:20pm
**Tutorial**
Chaired by: Mr. Todd Schneider and Dr. Dale Ferguson

### 3:20pm
**Tutorial - Internal Charging Mechanism, Discharge, Control and Effect**
- Mr. Kit Frankie Wong (Bastion Technologies, Inc.)

### 4pm
**9. Ground Testing**
Chaired by: Mr. Todd Schneider and Dr. Dale Ferguson
Continued from Tuesday, 5 April

4pm  Internal Electrostatic Discharge Testing of Polyimide Film Heaters in a Jovian Radiation Environment
» Mr. James Chinn (Jet Propulsion Laboratory, California Institute of Technology), Dr. Wousik Kim (Jet Propulsion Laboratory, California Institute of Technology), Mr. Dennis Thorbourn (Jet Propulsion Laboratory, California Institute of Technology), Mr. Eduardo Martin (Jet Propulsion Laboratory, California Institute of Technology), Mr. Juan Togual (Jet Propulsion Laboratory, California Institute of Technology)

4:20pm  Radiation-Induced Conductivity in Thin Dielectric Coatings
» Dr. Jason Young (The Aerospace Corporation), Dr. Mark W Crofton (The Aerospace Corporation)

4:40pm  Closing the Gap II: Test Approaches to Determine the Electrical Effects of Spacecraft Discharges
» Michael Bodeau (Consultant), Mrs. Nina Altshuler (Northrop Grumman)

Wednesday, 6 April

10am  10. Online Poster Session

Characteristics of Secondary Electron Emission on the Polyimide Degraded by Electron of Orbit Condition with Spacecraft Operation Period
» Mr. Kosuke Amamizu (Tokyo City University), Mr. Kaisei Enoki (Tokyo City University), Mr. Kosuke Sato (Tokyo City University), Prof. Hiroaki Miyake (Tokyo City University), Prof. Yasuhiro Tanaka (Tokyo City University)

Laboratory Simulations of Simultaneous Reduced Gravity and Ionizing Radiation Environments
» Mr. Achal Duhoon (Utah State University), Prof. JR Dennison (Utah State University)

Spacecraft Floating Potential Measurements on Contaminated Sweeping Langmuir Probes
» Ms. Rachel Conway (Embry Riddle Aeronautical University), Dr. Aroh Barjatya (Embry Riddle Aeronautical University), Dr. Shantanab Debchoudhury (Embry Riddle Aeronautical University)

A Comparison of Modeling Approaches for Collecting Bodies on Small Spacecraft
» Mr. Jason Powell (Utah State University), Dr. Charles Swenson (Utah State University)

Magnetic Field and Streaming Plasma Effects on Energy Harvesting from Spacecraft Charging
» Dr. Sean Young (Stanford University), Mr. Kofi Blake (Stanford University), Dr. Nicolas Lee (Stanford University), Mr. Jan Stupl (NASA Ames Research Center), Prof. Sigrid Close (Stanford University)

Development of Internal and Surface Charge Measuring Apparatus for Insulating Materials Using the Pulsed Electroacoustic Method
» Mr. Kaisei Enoki (Tokyo City University), Mr. Kazuki Endo (Tokyo City University), Prof. Hiroaki Miyake (Tokyo City University), Prof. Yasuhiro Tanaka (Tokyo City University)

Charging Test Facilities at ONERA-CNES Used for JUICE Mission Testing Phase
» Dr. Thierry Paulmier (ONERA), Dr. Mohamed Belhaj (ONERA), Dr. Virginie Inguimbert (ONERA), Mr. Denis Payan (CNES (The French Space Agency)), Mr. Gael Murat (ONERA), Mrs. Sarah Dadouch (ONERA)

Effect of Non-Maxwellian particle Distributions to Determine Critical Temperature on the Spacecraft Surface
» Dr. Nazish Rubab (University of Central Punjab, Pakistan)

Performance Evaluation of MgF2 Coated Electron Emitting Film for Preventing Spacecraft Charging Under Vacuum Ultraviolet Environment
» Mr. Daiki Hamada (Kyushu Institute of Technology), Prof. Mengu Cho (Kyushu Institute of Technology), Prof. Kazuhiro Toyoda (Kyushu Institute of Technology)
Continued from Wednesday, 6 April

Statistical Features of Surface Charging Plasma Environment in the Medium Earth Orbit
» Mr. Kosei Nagasawa (Osaka Prefecture University), Prof. Masao Nakamura (Osaka Prefecture University)

Beyond Analytic Inference Techniques with a Simulation and Regression Approach
» Prof. Richard Marchand (University of Alberta)

Development of a Fully Kinetic Particle Simulation Code for Coupled Plasma-dust Transport
» Mr. Jianxun Zhao (Missouri University of Science and Technology), Mr. David Lund (Missouri University of Science and Technology), Dr. Daoru Han (Missouri University of Science and Technology)

Passive Cathode Coatings and Devices for Spacecraft Charge Mitigation and Electrodynamic Tether Applications
» Dr. Jonathan Rameau (Physical Sciences Inc.), Mr. Nick Craig (Physical Sciences Inc.), Mr. Chase Buchanan (Physical Sciences Inc.), Dr. Christopher Lang (Physical Sciences Inc.), Dr. John Smedley (Los Alamos National Lab), Dr. Erik Muller (Brookhaven National Lab), Dr. Anirudha V. Sumant (Argonne National Lab), Dr. Byron David Green (Physical Sciences Inc.)

Assessment of Electrostatic Discharge Due to Internal Charging in Materials Deep Inside Spacecraft: Resistor-Capacitor Model with Discharge Effects
» Dr. Shinji Saito (National Institute of Information and Communications Technology), Dr. Tsutomu Nagatsuma (National Institute of Information and Communications Technology), Dr. Kaori Sakaguchi (National Institute of Information and Communications Technology), Prof. Hiroaki Miyake (Tokyo City University)

Simulated Charging of Teflon Tape in the GEO and Polar LEO Environments
» Dr. Brian Beecken (Department of Physics and Engineering, Bethel University, St. Paul, Minnesota), Dr. William Johnston (Air Force Research Laboratory, Space Vehicles Directorate, Kirtland AFB, NM)

Geosynchronous Surface Charging Assessment by Collaboration of Global Magnetosphere MHD Model and Spacecraft Charging Model
» Dr. Aoi Nakamizo (National Institute of Information and Communications Technology), Dr. Tsutomu Nagatsuma (National Institute of Information and Communications Technology), Prof. Masao Nakamura (Osaka Prefecture University), Dr. Kiyokazu Koga (Japan Aerospace Exploration Agency), Dr. Haruhisa Matsumoto (Japan Aerospace Exploration Agency), Prof. Yoshizumi Miyoshi (Nagoya University)

Propagated Uncertainties in Spacecraft Surface Charging
» Mr. Justin Likar (Johns Hopkins University Applied Physics Laboratory), Ms. Jessica Harryman (University of Maryland, Baltimore County (UMBC))

New Space ESD-resistant Smart-antistatic Wires and Cables Insulations
» Dr. Pierre-Yves Mikuš (Axon Cable), Mr. Gérard Biscaras (Axon), Ms. Stéphanie Huguenot (Axon Cable)

Spacecraft Charging Related Qualification of the Europa Clipper High Gain Antenna (HGA)
» Mr. Justin Likar (Johns Hopkins University Applied Physics Laboratory), Dr. Allen Andersen (Jet Propulsion Laboratory, California Institute of Technology), Mr. David Knapp (Lockheed Martin Advanced Technology Center), Ms. Milena Graziano (Johns Hopkins University Applied Physics Laboratory), Dr. Brian Xiaoyu Zhu (Jet Propulsion Laboratory, California Institute of Technology), Mr. Jaykob Maser (Lockheed Martin Advanced Technology Center), Ms. Meredith Nevius (Lockheed Martin Advanced Technology Center), Dr. Wousik Kim (Jet Propulsion Laboratory, California Institute of Technology), Dr. Matthew Bray (Johns Hopkins University Applied Physics Laboratory), Mr. Mike Noyes (AASC), Ms. Candace Davison (The Pennsylvania State University), Dr. Jason Feldman (Jet Propulsion Laboratory, California Institute of Technology)
Continued from Wednesday, 6 April

**Plasma Spacecraft Interaction Code (PSIC): Model Validation of the Twin-probe Method Using Chamber Measurements**  
» Dr. Omar Leon (University of Michigan), Dr. Walter Hoegy (University of Michigan), Dr. Brian Gilchrist (University of Michigan)

**Comprehensive Study of Vacuum Arcs on Solar Array Surfaces**  
» Dr. Dale Ferguson (AFRL), Dr. Boris Vayner (HXFive NASA/GRC)

**Spacecraft Charging Test Considerations for Composite Materials**  
» Dr. Allen Andersen (Jet Propulsion Laboratory, California Institute of Technology), Dr. Wousik Kim (Jet Propulsion Laboratory, California Institute of Technology), Prof. JR Dennison (Utah State University), Mr. Brian Wood (Utah State University), Mr. Todd Schneider (NASA Marshall Space Flight Center), Mr. Jason Vaughn (NASA Marshall Space Flight Center), Dr. Kenneth H. Wright (Universities Space Research Association – Science and Technology Institute), Mr. Nelson Green (Jet Propulsion Laboratory, California Institute of Technology), Dr. Eric Suh (Jet Propulsion Laboratory, California Institute of Technology), Dr. Joel Schwartz (Jet Propulsion Laboratory, California Institute of Technology)

**The NASA Charging Handbook Update to NASA-HDBK-4002B**  
» Dr. Wousik Kim (Jet Propulsion Laboratory, California Institute of Technology), Dr. Allen Andersen (Jet Propulsion Laboratory, California Institute of Technology), Mr. James Chinn (Jet Propulsion Laboratory, California Institute of Technology), Dr. Hank Garrett (Jet Propulsion Laboratory, California Institute of Technology), Mr. Al Whittlesey (Bastion Technologies, Inc.), Mr. Frankie Wong (Bastion Technologies, Inc.)

**Graphical User Interface for Data Analysis and Execution NASCAP (GUIDE NASCAP)**  
» Mrs. Anju Damodaran (URRao satellite centre, Indian Space Research Organization), Mr. Goutam Gupta (URRao satellite centre, Indian Space Research Organization), Mr. Pramod V B (URRao satellite centre, Indian Space Research Organization), Mrs. Neyanthy Rajesh (URRao satellite centre, Indian Space Research Organization), Mr. RV Nadagouda (URRao satellite centre, Indian Space Research Organization)

**Revisiting Design Rules for Floating Metal**  
» Michael Bodeau (Consultant), Mrs. Nina Altshuler (Northrop Grumman)

**Relationship Between Electron Collection Current and Conductive Tether Diameter**  
» Mr. Masahiko Tetsuya (Kyushu Institute of Technology), Prof. Kazuhiro Toyoda (Kyushu Institute of Technology), Dr. Teppei Okumura (Japan Aerospace Exploration Agency), Dr. Satomi Kawamoto (Japan Aerospace Exploration Agency), Dr. Yasushi Ohkawa (Japan Aerospace Exploration Agency)

**Experimental Study on the Space Electrostatic Discharge Effect and Single Event Effect of SRAM Devices for Satellites**  
» Dr. Xuan Wang (National Space Sciences Center / University of Chinese Academy of Sciences), Prof. Rui Chen (National Space Sciences Center / University of Chinese Academy of Sciences), Prof. Jianwei Han (National Space Sciences Center / University of Chinese Academy of Sciences), Dr. Runjie Yuan (National Space Sciences Center / University of Chinese Academy of Sciences), Dr. Qian Chen (National Space Sciences Center / University of Chinese Academy of Sciences), Dr. Yanan Liang (University of Chinese Academy of Sciences)

**PICASSO Cubesat: SSO Charging and Simulations of SLP Operations**  
» Dr. Jean Porto (ESA), Dr. Fabrice Cipriani (ESA/ESTEC), Dr. Gregoire Deprez (ESA), Dr. Sylvain Ranvier (BIRA-IASB), Dr. Jean-Pierre Lebreton (LPC2E/CNRS)

11:40am  Break
12pm  **11. On Orbit Investigations**  

Chaired by: Dr. Adrienne R. Dove and Dr. Michelle Donegan

**Effects of the Satellite Body on the Spin-modulated Component of the Satellite Potential as Observed by the Arase Satellite**

- Dr. Satoko Nakamura (Nagoya University), Prof. Yoshizumi Miyoshi (Nagoya University), Prof. Yasumasa Kasaba (Tohoku University), Prof. Tomoko Nakagawa (Tohoku Institute of Technology), Dr. Tomoaki Hori (Nagoya University), Dr. Shoya Matsuda (Kanazawa University), Prof. Yoshiya Kasahara (Kanazawa University), Prof. Yohei Miyake (Kobe University), Prof. Takanobu Muranaka (Chukyo University), Dr. Satoshi Kurita (Kyoto University), Dr. Masahiro Kitahara (Nagoya University), Prof. Iku Shinohara (JAXA)

12:20pm  **Possible Evidence for GOES-R Arcing Found in Ion and Electron Lines**

- Mr. Phoenix Price (George Washington University), Dr. Dale Ferguson (AFRL)

12:40pm  **Six Years of In-orbit Experience with Active Spacecraft Potential Control in the MMS Mission**

- Dr. Klaus Torkar (Space Research Institute, Austrian Academy of Sciences), Dr. Rumi Nakamura (Space Research Institute, Austrian Academy of Sciences), Dr. Owen W. Roberts (Space Research Institute, Austrian Academy of Sciences), Mr. Harald Jeszenszky (Space Research Institute, Austrian Academy of Sciences), Dr. Per-Arne Lindqvist (Royal Institute of Technology), Dr. Yuri Khotyaintsev (Swedish Institute of Space Physics), Dr. Barbara Giles (NASA Goddard Space Flight Center), Dr. Alexander C. Barrie (NASA Goddard Space Flight Center)

1pm  **Update on FPMU Measurements of International Space Station Charging**

- Dr. Joseph Minow (NASA Marshall Space Flight Center), Dr. Aroh Barjatya (Embry Riddle Aeronautical University), Dr. Victoria Coffey (NASA Marshall Space Flight Center), Dr. Shantanab Debchoudhury (Embry Riddle Aeronautical University), Dr. Linda Parker (Space Weather Solutions), Mr. William Schmid (The Boeing Company), Mr. Todd Schneider (NASA Marshall Space Flight Center), Dr. Emily Willis (NASA Marshall Space Flight Center), Dr. Eric Worthy (NASA Johnson Space Center), Dr. Kenneth H. Wright (Universities Space Research Association – Science and Technology Institute)

1:20pm  **Lunch/Dinner/Nap**

2pm  **12. Internal Charging**  

Chaired by: Insoo Jun and Dr. Wousik Kim

**The Satellite Charging Assessment Tool (SatCAT): Analyzing Observed On-orbit Anomalies**

- Dr. Janet Green (Space Hazards Applications LLC), Mr. Justin Likar (Johns Hopkins University Applied Physics Laboratory), Mr. Dave Pitchford (Carrington Space, LLC), Ms. Catherine Keys (Maxar Space LLC), Dr. Richard Quinn (Atmospheric and Environmental Research), Dr. Paul O’Brien (The Aerospace Corporation), Dr. Adam Kellerman (University of California, Los Angeles)

2:20pm  **Toward Validation of the AF-NUMIT3 Dielectric Charging Simulation Model**

- Dr. Brian Beecken (Department of Physics and Engineering, Bethel University, St. Paul, Minnesota), Mr. Zachary Gibson (Materials Physics Group, Physics Department, Utah State University, Logan, UT), Dr. David Cooke (Air Force Research Laboratory, Space Vehicles Directorate, Kirtland AFB, NM)
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<td>2:40pm</td>
<td>3D Internal Charging Analysis with FASTRAD</td>
<td>Dr. Jérémie-Marie Plewa (TRAD Tests and Radiations), Dr. Marie-Cécile Ursule (TRAD Tests and Radiations), Mr. Lucas Sarie (TRAD Tests and Radiations), Dr. Athina Varotsou (TRAD Tests and Radiations), Ms. Anne Samaras (AIRBUS Defence and Space), Mr. Florian Fontanel (AIRBUS Defence and Space)</td>
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<tr>
<td>3pm</td>
<td>Internal Charging Simulations Using THEMIS Model Developed for Irradiation History Effect on the Conductivity of Space Used Polymers</td>
<td>Dr. Pierre Sarrailh (ONERA), Dr. Thierry Paulmier (ONERA), Dr. Rémi Pacaud (ONERA), Dr. Ludivine Leclercq (ONERA), Mrs. Céline Michelin (ONERA), Mr. Denis Payan (CNES (The French Space Agency))</td>
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<td>3:20pm</td>
<td>Break</td>
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<td>3:40pm</td>
<td>13. Environments Chaired by: Dr. Fabrice Cipriani and Dr. Henry Garrett</td>
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<td>4pm</td>
<td>Impact of Energetic Particle Enhancements on Geostationary Meteorological Satellites</td>
<td>Dr. Kaori Sakaguchi (National institute of Information and Communications Technology), Dr. Tsutomu Nagatsuma (National institute of Information and Communications Technology)</td>
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<td>Low Altitude Charging Events Analysis of JASON-3 Using AMBER Data</td>
<td>Dr. Florine Enengl (Osl), Dr. Fabrice Cipriani (ESA/ESTEC), Dr. Mika Holmberg (Dublin Institute for Advanced Studies (DIAS)), Dr. Jean-André Sauvaud (IRAP), Dr. Denis Payan (CNES (The French Space Agency)), Dr. Jean-Charles Matéo-Vélez (ONERA), Dr. Angelica Sicard (ONERA), Dr. Benoit Lavraud (IRAP/CNRS)</td>
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<tr>
<td>4:20pm</td>
<td>ROSA and Solar Cell Module Combined Environments Test Plan</td>
<td>Dr. Kenneth Wright (USRA/STI), Mr. Bao Hoang (Maxar Space LLC), Mr. Todd Schneider (NASA/MSFC), Mr. Jason Vaughn (NASA/MSFC), Mr. Patrick Lynn (NASA/MSFC), Dr. Peter Bertone (NASA/MSFC), Dr. Ira Katz (Consultant), Mr. David Frate (NASA/GRC), Mr. Jeffrey Hognicki (NASA/GRC), Mr. Jeremiah McNatt (NASA/GRC), Mr. Brandon Klefman (NASA/GRC)</td>
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Thursday, 7 April

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<tr>
<td>10am</td>
<td>14. Charging and Arcing Mitigation Chaired by: Mr. Denis Payan and Prof. Mengu Cho</td>
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<td></td>
<td>Internal Charging (IESD) Test Results of candidate Cables and Charge Mitigation Strategies for the Europa Clipper Program</td>
<td>Mr. Justin Likar (Johns Hopkins University Applied Physics Laboratory), Mr. Todd Schneider (NASA Marshall Space Flight Center), Mr. Jason Vaughn (NASA Marshall Space Flight Center), Dr. Jamie Porter (Johns Hopkins University Applied Physics Laboratory), Mr. James Chinn (Jet Propulsion Laboratory, California Institute of Technology), Dr. Wousik Kim (Jet Propulsion Laboratory, California Institute of Technology), Dr. Kenneth H. Wright (Universities Space Research Association – Science and Technology Institute), Dr. Michelle Donegan (Johns Hopkins University Applied Physics Laboratory)</td>
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<tr>
<td>10:20am</td>
<td>Nascap Analysis of a Self-Charged Cubesat</td>
<td>Dr. David Cooke (Air Force Res Lab), Dr. Dale Ferguson (Air Force Res Lab.), Dr. Bryce Halter (Air Force Res Lab), Dr. Patrick Roddy (Air Force Res. Lab.)</td>
</tr>
<tr>
<td>10:40am</td>
<td>Touchless Spacecraft Potential Sensing Using Energetic Electron Beams and Active Photoemission</td>
<td>Mr. Álvaro Romero-Calvo (University of Colorado Boulder), Ms. Kaylee Champion (University of Colorado Boulder), Dr. Hanspeter Schaub (University of Colorado Boulder)</td>
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<td>11am</td>
<td><strong>Ion Beam Emission for Mitigation of Spacecraft Charging in Sunlight</strong>&lt;br&gt;Dr. Shu Lai (Boston College and Massachusetts Institute of Technology)</td>
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<td>11:20am</td>
<td><strong>Spectromicroscopic Imaging of Electron Emission from Diamond Triple-Point Junction Arrays</strong>&lt;br&gt;Dr. Jonathan Rameau (Physical Sciences Inc), Mr. John J. Leahy (Physical Sciences Inc), Mr. Nick Craig (Physical Sciences Inc), Ms. Raven Barnes (Physical Sciences Inc), Dr. Erik Muller (Brookhaven National Lab)</td>
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<td>11:40am</td>
<td><strong>Break</strong></td>
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<td>12pm</td>
<td><strong>15. Modeling</strong>&lt;br&gt;Chaired by: Dr. Emily Willis and Dr. Yihua Zheng</td>
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<td>12pm</td>
<td><strong>Effects of Plasma Wake on Spacecraft Charging Potential During Docking Operation in Polar Earth Orbit</strong>&lt;br&gt;Dr. Tepppei Okumura (Japan Aerospace Exploration Agency), Prof. Mengu Cho (Kyushu Institute of Technology)</td>
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<td>12:20pm</td>
<td><strong>Spacecraft Surface Charging Estimation Method Around the Geosynchronous Altitude</strong>&lt;br&gt;Prof. Masao Nakamura (Osaka Prefecture University), Ms. Ayane Yamamoto (Osaka Prefecture University), Dr. Aoi Nakamizo (National Institute of Information and Communications Technology), Dr. Tsutomu Nagatsuma (National Institute of Information and Communications Technology)</td>
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<td>12:40pm</td>
<td><strong>SPIS Improvements of the Physical Modelling of the Electrostatic Cleanliness Concerning Scientific Missions with Active Potential Control</strong>&lt;br&gt;Dr. Pierre Sarraillh (ONERA), Dr. Sebastien Hess (ONERA), Dr. Marc Villemant (ONERA), Dr. Alessandro Retino (LPP), Mr. Guillaume Tcherniatinsky (LPP), Mr. Benjamin Jeanty-Ruard (Artenum, Toulouse), Mr. Julien Forest (Artenum, Paris), Dr. Fabrice Cipriani (ESA), Dr. Gregoire Deprez (ESA)</td>
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1pm Challenges for Charging Predictions of ESA Solar System Missions: JUICE, SOLAR ORBITER, AND BEPI COLOMBO
Dr. Fabrice Cipriani (ESA/ESTEC), Dr. Gregoire Deprez (ESA), Dr. Jean Porto (ESA)

1:20pm Lunch/Dinner/Nap

2pm 16. Ground Testing<br>Chaired by: Dr. Kiyokazu Koga and Mr. Jason Vaughn

2pm **Characteristics of Material Interactions with Space Environments (ChaMISEn): Toward a Data Management System for the Material Properties**<br>Dr. Sebastien Hess (ONERA), Dr. Ludivine Leclercq (ONERA), Dr. Pierre Sarraillh (ONERA), Dr. Jean-Francois Roussel (ONERA)

2:20pm Results of Radiation-Induced Conductivity Testing of Europa Clipper Dielectric Materials<br>Dr. Allen Andersen (Jet Propulsion Laboratory, California Institute of Technology), Mr. Nelson Green (Jet Propulsion Laboratory, California Institute of Technology), Dr. Qian Nataly Chen (Jet Propulsion Laboratory, California Institute of Technology), Mr. Dennis Thorbourn (Jet Propulsion Laboratory, California Institute of Technology), Dr. Brian Xiao Yu Zhu (Jet Propulsion Laboratory, California Institute of Technology), Dr. Wousik Kim (Jet Propulsion Laboratory, California Institute of Technology)

2:40pm **The Europa Clipper Radiation Monitor (RadMon) Internal Charging: Testing and Modeling Results**<br>Dr. Zachary Yokley (Johns Hopkins University Applied Physics Laboratory), Mr. John Goldsten (Jo), Mr. Justin Likar (Johns Hopkins University Applied Physics Laboratory), Dr. Timothy Brubaker (Johns Hopkins University Applied Physics Laboratory), Dr. Richard Meitzler (Johns Hopkins University Applied Physics Laboratory)

3pm **Modeling the Effects of Surface Roughness on Electron Yield**<br>Mr. Trace Taylor (Materials Physics Group, Physics Department, Utah State University), Mr. Matthew Robertson (Materials Physics Group, Physics Department, Utah State University), Prof. JR Dennison (Utah State University)

3:20pm Break
### 17. Surface Charging

**Chaired by:** Dr. Thierry Paulmier and Dr. Linda Parker

**3:40pm**

**Experimental and Theoretical Study on Secondary Electron Emission Characteristics of Fluorocarbon Films**

- Dr. Qi Zhao (Tianjin Key Laboratory of Internet of Things in Electricity, State Grid Tianjin Electric Power Research Institute)
- Prof. Guo Yixin (State Grid International Development Co., Ltd.)

### 4pm

**Monte Carlo simulation of the Electron Emission Yield of Negative Polarized Amorphous SiO2 Thin Films Under Low Energy Incident Electron Spectrum**

- Mr. Quentin Gibaru (ONERA/CNES/CEA)
- Dr. Christophe Inguimbert (ONERA)
- Dr. Mohamed Belhaj (ONERA)
- Dr. Melanie Raine (CEA DAM)
- Dr. Damien Lambert (CEA DAM)

### 4:20pm

**Measuring Multiple Potentials of a Rotating and Differentially-Charged Object Simultaneously Using X-rays**

- Mr. Julian Hammerl (University of Colorado Boulder)
- Ms. Andrea López (University of Colorado Boulder)
- Mr. Álvaro Romero-Calvo (University of Colorado Boulder)
- Dr. Hanspeter Schaub (University of Colorado Boulder)

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### Friday, 8 April

**10am**

**18. Charging and Arcing Mitigation**

**Chaired by:** Mr. Justin Likar and Dr. Teppei Okumura

**10am**

**Numerical Study of the Dependence of the Voltage Threshold of Solar Cells ESDs on Material Properties and Geometrical Configurations.**

- Dr. Sebastien Hess (ONERA)
- Dr. Julien Jarrige (ONERA)
- Mr. Denis Payan (CNES (The French Space Agency))
- Dr. Jean-Charles Matéo-Vélez (ONERA)
- Dr. Virginie Inguimbert (ONERA)
- Dr. Pierre Sarraillh (ONERA)

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**10:20am**

**Adding Radiation Induced Conductivity Test Capability to the JPL Dynamitron**

- Mr. Nelson Green (Jet Propulsion Laboratory, California Institute of Technology)
- Mr. Dennis Thorbourn (Jet Propulsion Laboratory, California Institute of Technology)
- Mr. Anthony Eyre (Jet Propulsion Laboratory, California Institute of Technology)
- Dr. Allen Andersen (Jet Propulsion Laboratory, California Institute of Technology)
- Mr. Michael McKee (Jet Propulsion Laboratory, California Institute of Technology)
- Mr. Jarrett Chai (Jet Propulsion Laboratory, California Institute of Technology)

**10:40am**

**Solar Powered Excess Electron Emission Device (SPEEED)**

- Mr. Richard Adamo (SRI International - Retired)
- Mr. Paolo Sechi (SRI International)

**11am**

**Characterization of Flash-over Propagation on Solar Panels - Preliminary Results of EMAGS 4 Project**

- Dr. Julien Jarrige (ONERA)
- Mr. Gael Murat (ONERA)
- Dr. Loanne Monnin (ONERA)
- Dr. Sebastien Hess (ONERA)
- Dr. Virginie Inguimbert (ONERA)
- Dr. Pierre Sarraillh (ONERA)

**11:20am**

**Rendezvous Differential Charging and Discharge Simulation with SPIS**

- Dr. Gregoire Deprez (ESA)
- Dr. Fabrice Cipriani (ESA/ESTEC)
- Dr. Pierre Sarraillh (ONERA)
- Dr. Sebastien Hess (ONERA)
- Dr. Henning Wulf (OHB)
- Dr. Jens Laube (OHB)

**11:40am**

**Break**

**12pm**

**19. Ground Testing**

**Chaired by:** Mr. Nelson Green and Prof. JR Dennison

**12pm**

**Discharge Current Measurement of Charged Floating Metal**

- Prof. Kazuhiro Toyoda (Kyushu Institute of Technology)
- Ms. Nozomi Horinouchi (Kyushu Institute of Technology)
- Mr. Sho Iwamoto (Kyushu Institute of Technology)
# The 16th Spacecraft Charging Technology 04 - 08 Apr 2022

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<td><strong>Development of Secondary Electron Emission Measurement System Irradiated by Proton</strong></td>
<td>Mr. Hiroki Yajima (Tokyo City University), Ms. Akane Komori (Tokyo City University), Prof. Hiroaki Miyake (Tokyo City University), Prof. Yasuhiro Tanaka (Tokyo City University), Mr. Hagura Naoto (Tokyo City University)</td>
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<td>12:40pm</td>
<td><strong>Surface Potential Measurement with Pockels Effect Under Electron Beam and Vacuum Ultraviolet Environment</strong></td>
<td>Prof. Kazuhiro Toyoda (Kyushu Institute of Technology), Mr. Masaki Takuma (Kyushu Institute of Technology), Ms. Sayaka Kose (Kyushu Institute of Technology), Prof. Mengu Cho (Kyushu Institute of Technology)</td>
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<td>1pm</td>
<td><strong>Development of an Experimental Instrumentation Dedicated to ESDs Testing and Measurements on Nanosatellites</strong></td>
<td>Dr. Jean-Charles Mateo-Velez (ONERA), Dr. Jean Guérard (ONERA), Ms. Elana Helou (University of Southern California), Mr. Haroon Khan (University of Southern California), Prof. Joseph Wang (University of Southern California)</td>
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<td>1:20pm</td>
<td>Lunch/Dinner/Nap</td>
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<td>2pm</td>
<td><strong>20. Modeling</strong></td>
<td>Chaired by: Prof. Joseph Wang and Dr. Anthony DeStefano</td>
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<td>2pm</td>
<td><strong>Implementation of Charged Dust Dynamics in a Spacecraft Contamination Code</strong></td>
<td>Dr. Lubos Brieda (Particle in Cell Consulting LLC), Ms. Elana Helou (University of Southern California), Mr. Haroon Khan (University of Southern California), Prof. Joseph Wang (University of Southern California)</td>
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<td>2:20pm</td>
<td><strong>FEEP Thrusters, Influence on Spacecraft Surface Charging and Cleanliness, Application to LISA Mission Case</strong></td>
<td>Dr. Marc Villemant (ONERA), Dr. Pierre Sarraillh (ONERA), Dr. Sébastien Hess (ONERA), Dr. Fabrice Cipriani (ESA-ESTEC), Dr. Gregoire Deprez (ESA-ESTEC)</td>
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<td>2:40pm</td>
<td><strong>Computationally Enriched EP Plume Data for Trustworthy Satellite Contamination Studies</strong></td>
<td>Dr. Ullrich Siems (SPARC Industries sarl), Mr. Dejan Petkow (SPARC Industries sarl), Mr. Sander Rouwette (SPARC Industries sarl), Dr. Raphael Schmit (SPARC Industries sarl), Mr. Brice Mockel (SPARC Industries sarl), Ms. Sawsen Chibani (SPARC Industries sarl), Dr. Rabab Bouziane (SPARC Industries sarl), Mr. Fa Zhu (SPARC Industries sarl), Mr. Anant Chandra (SPARC Industries sarl), Mr. Davar Feili (ESA-ESTEC), Mr. Gregoire Deprez (ESA-ESTEC)</td>
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<td>3pm</td>
<td><strong>Electrostatic Analysis of GSAT-19 Satellite Structure for Absolute Charging</strong></td>
<td>Prof. Keyur Patel (DHARMSINH DESAI UNIVERSITY), Dr. Rizwan Alad (DHARMSINH DESAI UNIVERSITY), Prof. Ashish Pandya (DHARMSINH DESAI UNIVERSITY), Dr. Suryakant Gupta (FCIPT, Institute of Plasma Research, Ahmedabad)</td>
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<td>3:20pm</td>
<td><strong>Closing Remarks / SCTC2024 Announcement</strong></td>
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