

Chair's Report on the 2022 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, July 10-15, 2022, Denver, Colorado, USA

Branislav M. Notaros
AP-S/URSI 2022 General Chair

IEEE International Symposium
on Antennas & Propagation
& **USNC-URSI**
Radio Science Meeting

JULY 10-15, 2022 • DENVER



The 2022 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting – AP-S/URSI 2022, www.2022apsursi.org, was held from July 10-15, 2022, in Denver, Colorado, USA, the “Mile High City”. The conference was cosponsored by the IEEE Antennas and Propagation Society (AP-S) and the US National Committee (USNC) for the International Union of Radio Science (URSI). In spite of the unprecedented challenges resulting from the uncertainty due to the global situation with the pandemic and the previous edition of the conference occurring with almost half a year delay (Singapore, December 2021), our 2022 edition was a truly memorable and most technically productive and professionally rewarding event (www.2022apsursi.org/technical_program.php), as well as socially enjoyable throughout all days of the conference (www.2022apsursi.org/registration.asp). Our attendees were openly and vividly enthusiastic about the opportunity to reboot, reset, reconnect, and reunite with colleagues and friends, most of whom they have not seen in-person for three long years! And, of course, to make new connections and friendships, for many years to come. In short, based on testimonies of the participants, the Denver conference was clearly a great success!



The conference venue consisted of two outstanding nearby hotels in historic LoDo (Lower Downtown) Denver, the Hyatt Regency and Grand Hyatt, with spectacular conference spaces, ballrooms, meeting rooms, and excellent guestrooms at great conference rates, www.2022apsursi.org/venue.php. Short Courses and Workshops and all Saturday and Sunday meetings, as well as the Awards Ceremony on Wednesday, were held at the Grand Hyatt, with the majority of conference activities taking place at the Hyatt Regency. Our venue was at 5280 feet or 1609 meters (a mile) above sea level. Conference attendees also enjoyed unforgettable views of nearby mountain peaks, some reaching “14k” (fourteen thousand feet). Many conference participants brought their family and friends for a great combination of work and play.

Accompanying Person Activities included Colorado sightseeing tours, and memorable interactions in the stunning Companion Suite at Peaks Lounge, atop the 27-story Hyatt Regency, with breathtaking panoramic views.



AP-S/URSI 2022 Denver Steering and Organizing Committee

General Chair

Branislav Notaros
notaros@colostate.edu

Vice-General Chair

Dejan Filipovic
dejan.filipovic@colorado.edu

Technical Program Chair

Andrew Peterson
afpeterson@gatech.edu

TPC Co-Chairs

Stephen Gedney
stephen.gedney@ucdenver.edu
David Jackson
djackson@uh.edu
Karl Warnick
warnick@ee.byu.edu

Special Sessions Chairs

Randy Haupt
rhaupt@mines.edu
Reyhan Baktur
reyhan.baktur@usu.edu

Short Courses and Workshops Chairs

Zhen Peng
zvpeng@illinois.edu
Pai-Yen Chen
pychen@uic.edu

Student Paper Competition Chairs

Asimina Kiourti
kiourti.1@osu.edu
John Young
john.c.young@uky.edu
Amanda Malone
amanda.malone@ieee.org

Student Design Contest Chairs

Mohamed Elmansouri
mohamed.elmansouri@colorado.edu
Glauco Fontgalland
fontgalland@dee.ufcg.edu.br

Young Professionals Chair

Jeanne Quimby
jeanne.quimby@nist.gov

Local Arrangements Chair

Olivera Notaros
olivera@colostate.edu

Publicity Chairs

Su Yan
su.yan@howard.edu
Vladimir Okhmatovski
Vladimir.Okhmatovski@umanitoba.ca

Finance Chair

Dejan Filipovic
dejan.filipovic@colorado.edu

Sponsors Chairs

Albin Gasiewski
al.gasiewski@colorado.edu
Neill Kefauver
w.neill.kefauver@lmco.com

Exhibits Chairs

Payam Nayeri
pnayeri@mines.edu
Gregor Lasser
gregor.lasser@colorado.edu

URSI/AP-S Liaison

Steven Reising
steven.reising@colostate.edu

International Liaison

Ross Stone
r.stone@ieee.org

Women in Engineering and Radio Science

Cynthia Furse
cfurse@ece.utah.edu
Francesca Vipiana
francesca.vipiana@polito.it
Reyhan Baktur
reyhan.baktur@usu.edu

Regions 8–10 Outreach Coordinators

Albert Lysko
alysko@csir.co.za
Felix Vega
jfvegas@unal.edu.co
Meisong Tong
mstong@tongji.edu.cn

Social Programs and Hospitality

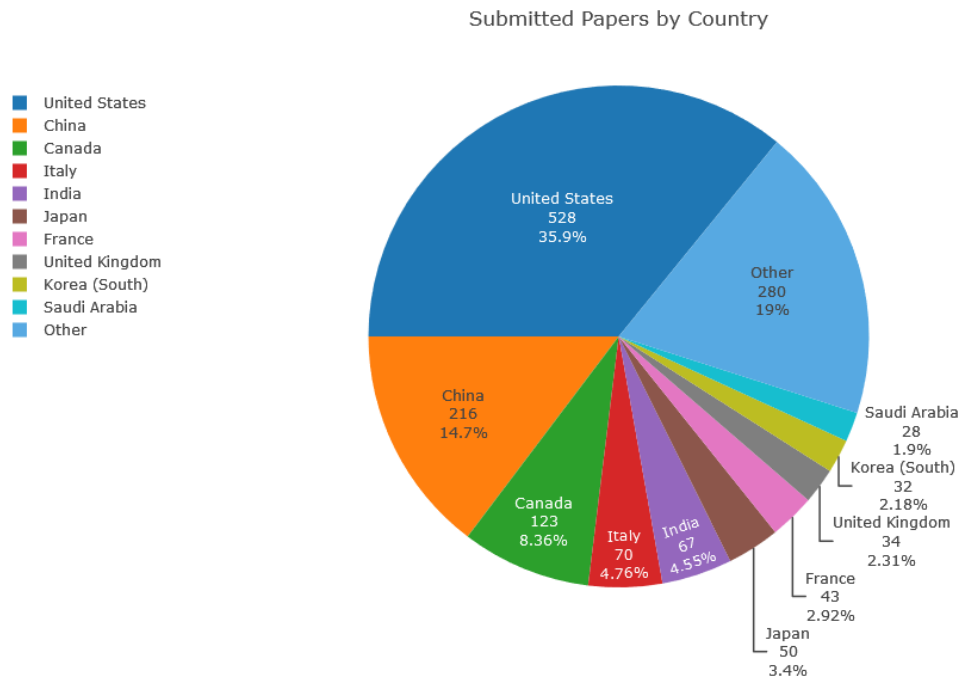
Olivera Notaros; Joanne Wilton;
Susan Stone; Judy Long

We had a late paper submission deadline, due to the closeness of the AP-S/URSI 2021 Singapore conference, and then needed to extend it further based on requests by authors. From the extended deadline to the paper acceptance emails and visa letters, reviews of papers were completed in a record short time. The international distribution of submitted papers (per country) was as in pre-pandemic times.

The highly illuminating and relevant technical program consisted of 1371 orally presented papers, placed in 15 parallel sessions in each day of the conference, and no poster sessions, www.2022apsursi.org/technical_program.php. The program featured 24 excellent Special Sessions throughout the conference, including several memorial sessions, and a diverse set of 11 engaging Short Courses and Workshops, occurring on Sunday, July 10.

The conference was held in-person, with special provisions for virtual presentation for those authors and attendees unable to attend in-person due to pandemic-related issues or the inability to get a visa in some countries for travel to the conference, www.2022apsursi.org/covid.php. Virtual Presentation Application Form was provided on the conference website. Virtual authors uploaded a video recording of their presentation, which was played during their session, together with in-person presentations. Additionally, videos were posted and were available for viewing to all conference registrants before, during, and after the conference. Questions for video presentations were being submitted through a Q&A feature on the conference website, enabling online interaction. In-person authors were also invited (though not required) to provide a video to add to the Virtual Forum. The technical sessions included a total of 437 virtual presentations, with the

reason for converting the presentation from in-person to virtual being the pandemic in 247 cases and visa problems for 190 papers.



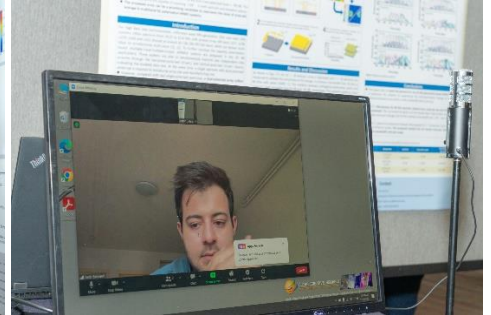
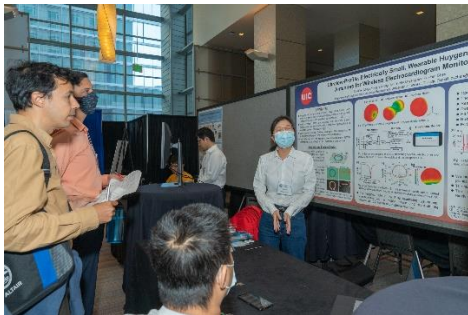
We had 1471 registered conference attendees and a record number (608) of Student Registrations. To help our members and attendees as much as possible, conference registration fee rates were on average at the level of pre-pandemic conferences. With respect to the previous in-person conferences, the regular registration rate was increased slightly per year, less than average annual inflation and less than the increase of all costs for the conference. Student registration rate was drastically reduced, as well as that for retired colleagues, www.2022apsursi.org/registration.asp. The maximum number of papers per registration was: 3 papers per regular registration and 2 papers per student registration. There were many excellent travel grant opportunities (some “old”, some recent, and some brand new), <https://2022apsursi.org>, and record numbers of travel grant awardees among students, women, and other attendees.

1471 registered from 50 countries:

Australia	Greece	Pakistan
Austria	Hong Kong	Poland
Belgium	India	Portugal
Brazil	Indonesia	Russia
Canada	Iran	Saudi Arabia
Chile	Ireland	Serbia
China	Israel	Singapore
Colombia	Italy	South Africa
Croatia (Hrvatska)	Japan	Spain
Cyprus	Jordan	Sweden
Czech Republic	Kazakhstan	Switzerland
Denmark	Korea (South)	Taiwan
Egypt	Kuwait	Turkey
Finland	Lebanon	United Arab Emirates
France	Malaysia	United Kingdom
Germany	Mexico	United States
Ghana	Netherlands	

The AP-S Student Paper Competition (SPC), www.2022apsursi.org/spc.php, and AP-S Student Design Contest (SDC), www.2022apsursi.org/sdc.php, were held on Tuesday, July 12, the “Students Day”, in the foyer of the Exhibit Hall. Master Class on “Non-ionizing electromagnetic wave interactions with human tissue: Opportunities for advancing healthcare technologies,” www.2022apsursi.org/master_class.php, compellingly delivered by Prof. Susan Hagness on Monday, July 11, was the first in-person AP-S Master Class. It drew a large attendance and ignited a vibrant discussion. Women in Engineering and Radio Science Lunch event on Tuesday, July 12, featured Prof. Zoya Popovic, who

passionately and reflectively spoke about “Choosing Role Models for a Successful Career”, www.2022apsursi.org/wie.php. Young Professionals Career Development and Growth Conversations, during lunch time on Thursday, July 14, included ten industry, academic, and government leaders providing career guidance through small group gatherings. During Reviewers’ Lunch on Wednesday, July 13, Editors-in-Chief of AP-S journals presented the state of the publications, current activities, and future plans. In addition, the AP-S Administrative Committee (AdCom), all AP-S Standing Committees, Editorial Boards, and USNC-URSI Commissions A, B, C, D, E, F, and K held their business meetings at various times throughout the conference, www.2022apsursi.org/technical_program.php.



We introduced and organized many new events and activities for the Denver conference that were not done before, www.2022apsursi.org/registration.asp, and all were very well received. One of the biggest new initiatives was the “Industry Day” on Thursday, July 14, including Plenary Talks, Industry Special Sessions, Young Professionals Career Development and Growth Conversations, etc. The AP-S/URSI 2022 Denver Plenary Session was the first one in recent memory, with three outstanding and very diverse keynote talks coming from industry, government, and large international collaboration, respectively. The session highlighted (i) “AP-S Distinguished Industry Speaker Series Talk: Amazon’s Project Kuiper: Overcoming Antenna Design Challenges to Advance Global Broadband Connectivity and Reach Unserved and Underserved Communities” – by Dr. Nima Mahanfar, a founding team member of Project Kuiper, at Amazon; (ii) “AP-S/URSI 2022 Keynote Talk: Antennas Outside of the Box” – by Dr. Dev Palmer, Deputy Director of the Defense Advanced Research Projects Agency (DARPA) Microsystems Technology Office; and (iii) “AP-S/URSI 2022 Keynote Talk: Event Horizon Telescope Imaging of Black Holes: How Antenna Arrays Discovered a Black Hole at the Center of Our Galaxy!” – by Dr. Geoffrey Bower, Chief Project Scientist for the Event Horizon Telescope Collaboration, www.2022apsursi.org/plenary_talks.php. The Plenary Session was extremely well attended and received, with lively discussion and many questions following each talk, as well as evening University-Industry Reception to conclude the day with keynote speakers, conference sponsors and exhibitors, and society leaders, at hand.



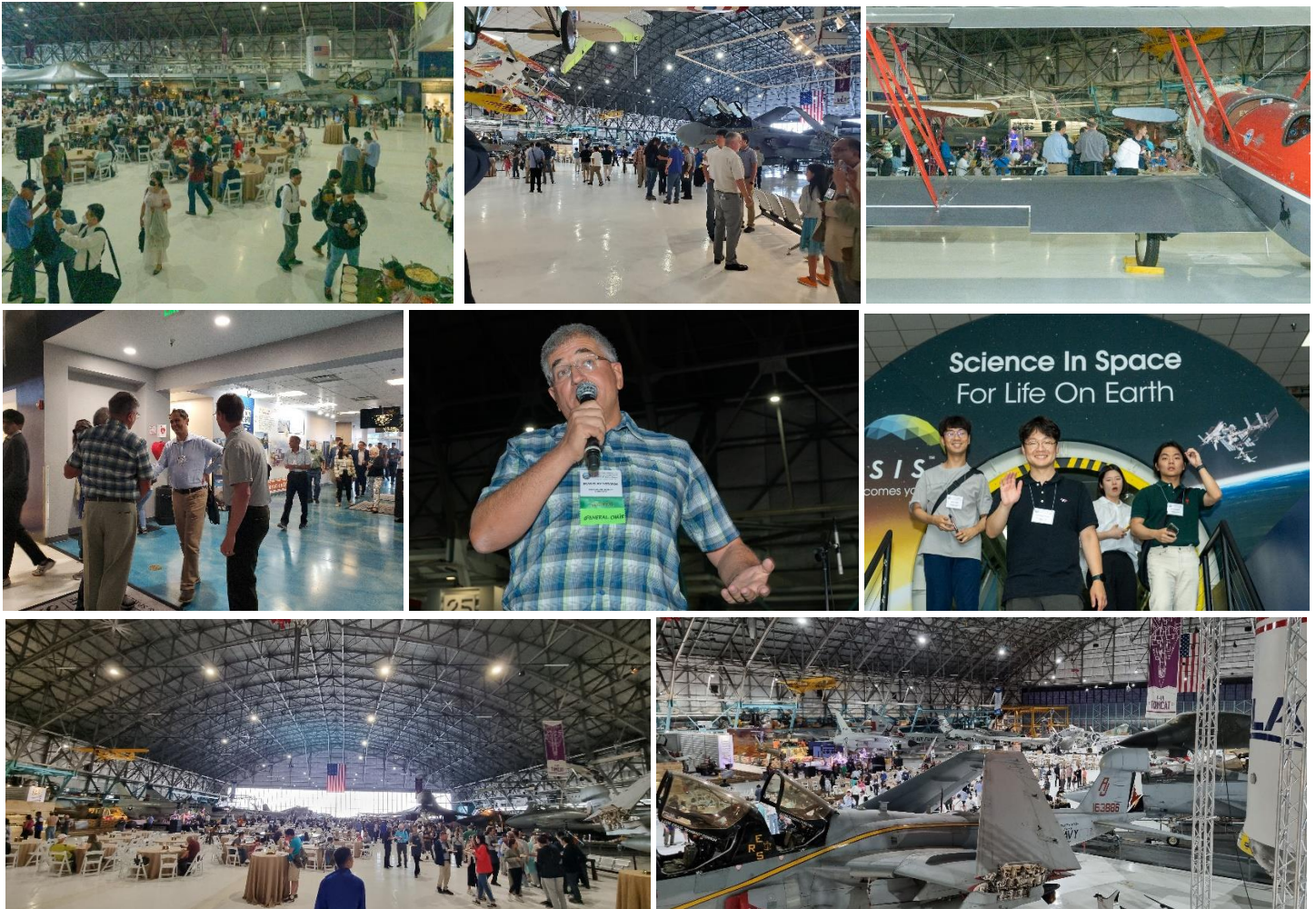
A signature of the Denver conference was our efforts to enhance impactful industry involvement and presence within the AP-S, to complement our academic/university strengths. As a part of this, we had prepared a truly spectacular Exhibit Hall, and recruited, in spite of the challenges mentioned above, more Sponsors (including Diamond) and more Exhibitors than prior AP-S/URSI conferences. This included 12 sponsorship contracts, and 43 companies and 6 non-profit organizations completely filling the available exhibit booths, www.2022apsursi.org/sponsors_exhibitors.php. In addition, 10 companies ran scheduled interactive demonstrations in the specially assigned demo area in the Exhibit Hall, www.2022apsursi.org/demos.php. The Exhibit Hall and the large foyer in front of it were the heart of the conference activities and interactions, including the AP-S Student Paper Competition and AP-S Student Design Contest.

2022 IEEE AP-S/URSI Sponsors and Exhibitors





The largest gathering of the conference was the Welcome Reception on Monday, July 11, at the Wings Over the Rockies Air & Space Museum, www.2022apsursi.org/social_program.php, a WWII aircraft hangar converted into an extremely interesting museum, with a unique and gigantic place where all our attendees and their families were able to entertain together. We had A-7 and F-111 open cockpits for everyone to climb and explore, with Wings staff explaining the inner workings of these historic aircrafts, as well as flight simulators where our attendees and their family members bravely flew fighter jets with full motion 3-D “Top Gun” experiences. Some attendees were flying radio-controlled planes, coached by Wings instructors. There was a Blimp (dirigible) with the AP-S/URSI 2022 Denver logo flying around and periodically dropping prizes for the lucky attendees. It was fantastic to see so many happy faces, having fun together. Many non-US students told me that this was their first trip to the US and they were incredibly grateful for an experience that typically cannot be acquired elsewhere, including entertaining by the Colorado Country Music Band.





Students and Young Professionals Networking and Dinner Event was held on Tuesday, July 12, at Wynkoop Denver, a Colorado-authentic historic place visited by many celebrities and US Presidents. Our Students and Young Professionals, and Advisors alike, enjoyed tremendously the 15 tournament-sized billiards tables, foosballs, and other games. Simply, everybody had a “blast” that evening. We all witnessed a miraculous creation of friendships and networks during these fun competitions and interactions, many of which were further enhanced at subsequent technical, professional, and social events of the conference.

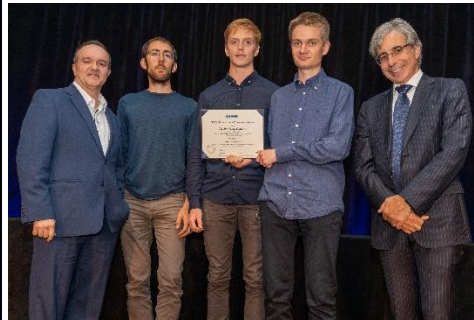


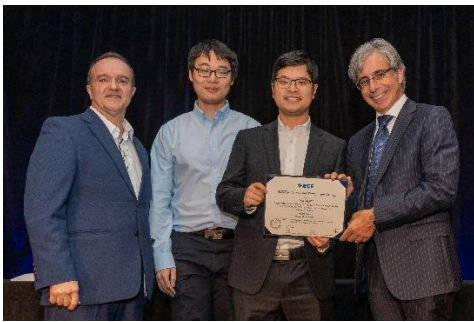


Our Awards Ceremony, on Wednesday, July 13, highlighted a record number of IEEE-level awards (2022, 2021, and 2020 IEEE Electromagnetics Awards and 2020 Tomiyasu Award) presented by the 2022 IEEE President, Prof. Ray Liu, and many AP-S Field Awards and Paper Awards, presented by the AP-S President, Prof. Gianluca Lazzi, as well as Chapter Awards, Travel Grants, SPC Awards, and SDC Awards. A “novelty” here was a jazz quartet playing “walk up tunes” as the awardees were walking to the stage and the photos were taken. Especially amusing were the “drumrolls” prior to announcements of the third, second, and first places for winners of the AP-S Student Paper Competition and AP-S Student Design Contest, respectively (these winners were kept secret until then), with the “drumrolls” being noticeably loudest when the first-place winners were just to be announced. Note that all the awardee names and award details, for all IEEE and AP-S awards, will be publicized in subsequent AP-S publications.

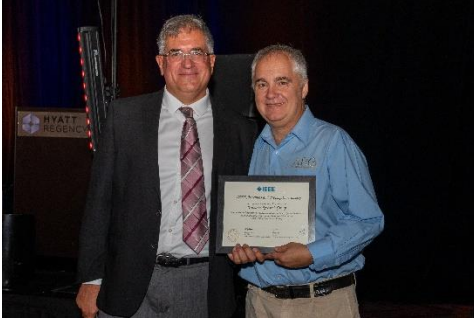








This was followed by the Conference Banquet which celebrated the conference, awardees, authors, members, and attendees. Conference General Chair presented Certificates of Recognition to conference Sponsors and members of the Steering and Organizing Committee. Entertainment was by a fantastic 11-member Denver's Radio Band, with a packed dancing floor for two and a half hours (including overtime). Comments were that we almost never had such a massive and long dancing "session" at AP-S/URSI conference banquets, as another indication that people craved for face-to-face social interactions, along with technical and professional ones.





The Denver conference made concerted efforts to make the last day of the conference (Friday, July 15) more interesting for everyone, to as much as possible avoid the usual situation with attendees, especially students, presenting on Friday in almost empty conference rooms, with deserted hallways and breaks, whereas Friday papers constitute a fifth of the conference papers and a fifth of the authors correspondingly. We introduced a Closing Reception on Friday evening, as a celebration of the conference, with food, drinks, and live entertainment (jazz orchestra). The reception was, somewhat unexpectedly, a stunning success, with a very large number of attendees relaxing after a full week of papers, presentations, courses, demos, technical discussions, professional meetings, and social activities, and celebrating memorable experiences in Denver and many friendships. We also introduced an enlightening interactive Panel, moderated by AP-S Young Professional Ambassadors, with IEEE and AP-S Awardees during Friday lunch break, with highlights of their technical achievements, career and life paths, reflections, and guidance to the audience.

To further make the end of the conference more interesting, we organized a Conference Networking Event: A Private AP-S/URSI 2022 Organized Tour of Rocky Mountains on Saturday, July 16. We visited the spectacular Rocky Mountain National Park, one of the oldest and most visited national parks in the US, in buses with expertly tour guides, riding along the Trail Ridge Road. This is the highest motorway in the US, where the AP-S/URSI 2022 participants enjoyed the “roller coaster” experience at the highest, tipping, point – at 12,183 feet (3713 m) altitude – of our tour. We picnicked in the “Land Above the Trees” at 11,796 feet (3595 m) above the sea level, feeling like on the top of the world with fascinating alpine tundra landscapes and nearby mountain peaks reaching almost 14k (feet). We saw some beautiful elk, deer, bighorn sheep, and moose (a rare find in the park). We stopped at the Continental Divide, the undrawn line traversing all of the Americas to separate drainages to the Atlantic and the Pacific and hiked the Roaring River, displaying the equally magnificent and destructive power of nature, with “flying” boulders (many much larger than a car) carried by the roaring flood wave on the morning of July 15, 1982 now deposited on the river banks. The tour finished with a visit to the fascinating mountain town of Estes Park (7500 ft), best known for the historic haunted Stanley Hotel (famous for Stephen King’s “The Shining”). These venues were truly unique and spectacular, and this tour was a great “avenue” for networking and “society” building.



Based on all the statistics and measurable outcomes, as well as hundreds of face-to-face comments and email messages I have received from the authors and participants, the conference was a great success. This is evident especially when assessed by the happiness and gratefulness of the attendees, and I believe the students most noticeably. On behalf of all AP-S/URSI 2022 Denver participants, I would like to thank Prof. Dejan Filipovic, Vice-General Chair, Prof. Andrew Peterson, Technical Program Committee (TPC) Chair, Profs. David Jackson, Karl Warnick, and Stephen Gedney, TPC Co-Chairs, Prof. Olivera Notaros, Local Arrangements Chair, and all members of the Steering and Organizing Committee of our conference, www.2022apsursi.org/organizing_committee.php, for their fantastic collaboration and for their time, effort, and spirit in making this happen in spite of all of the unprecedented challenges.

It was my utmost honor and pleasure to be of service to the AP-S, URSI, and the electromagnetics community and lead the organization of AP-S/URSI 2022 and host so many great researchers, educators, practitioners, and students in antennas, propagation, electromagnetic engineering, and radio science, all fantastic colleagues and friends, in Denver in July. As I mentioned at the Welcome and Closing Receptions and the Conference Banquet, the preparations for this one-week event lasted exactly four years, and it was a once-in-a-lifetime opportunity and adventure. Many international attendees visited the US for the first time. Many US attendees visited Colorado and the “Mile High City” for the first time. And almost all AP-S/URSI 2022 delegates visited Wings, Wynkoop, Hyatt Regency Denver, and Rocky Mountain National Park for the first time. To all, please visit again! And I hope to see you all and many others at our future flagship conferences throughout the world.

