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ABSTRACTS DUE OCTOBER 4

ION INSTITUTE OF NAVIGATION

ITM INTERNATIONAL TECHNICAL MEETING

PTTI PRECISE TIME AND TIME INTERVAL SYSTEMS AND APPLICATIONS MEETING

January 22–25, 2024
Hyatt Regency Long Beach
Long Beach, California

CALL FOR ABSTRACTS
ABSTRACTS DUE OCTOBER 4

ion.org

One Registration Fee, Two Technical Events and a Commercial Exhibit

CALL FOR ABSTRACTS: ABSTRACTS DUE OCTOBER 4, 2023

Abstract Submission

Abstracts should be submitted electronically via the ION Abstract Management Portal, no later than October 4, 2023.

ION strongly encourages authors to present in-person in Long Beach. Authors will be given the option at the point of abstract submission to submit for "in-person presentation with video presentation for remote viewers" or "virtual presentation only." Authors will not be permitted to change from in-person presentation to virtual presentation after the program is finalized.

To submit an abstract, sign in at ion.org/abstracts. If you have not used the Abstract Management Portal before, click "Create My Account." Once signed in, click on the appropriate meeting name and complete the form.

- Abstracts should describe objectives, anticipated or actual results, conclusions, any key innovative steps and the significance of your work.
- Authors will be provided with an electronic author's kit with presentation and publication guidelines in early November.
- All authors presenting at the meeting, in-person or virtually, are required to pay registration fees.

Final Manuscripts

ITM Peer Reviewed Sessions: Completed manuscripts must be uploaded to the Abstract Management Portal (AMP) by December 1, 2023. Manuscripts will be peer reviewed by session co-chairs and designated as a primary paper, or as an alternate paper, in the onsite program based on peer review of the full manuscripts. Manuscripts not received by December 1, 2023 will not be peer reviewed. Manuscripts meeting established peer review standards will be designated as "peer reviewed" in the conference proceedings. Manuscripts will only be peer reviewed one time. Authors will be given the opportunity to make corrections/revisions to their manuscripts for inclusion in the proceedings through February 5, 2024. However, revised manuscripts will not be re-reviewed for peer review designation.

To be included in the conference proceedings:

1. Manuscripts must be uploaded into AMP by December 1, 2023.
2. The submitted manuscript must be representative of the original abstract submitted.
3. The presenting author must be registered for the conference and pay the conference registration fee (in-person and virtual presentations).
4. Video file, presentation file, and media/copyright release form must be uploaded into AMP by January 12, 2024.
5. The presenting author must attend the mandatory speakers' breakfast the morning of their session.
6. Corrections to manuscript (and optional presentation file) must be submitted to AMP by February 5, 2024 to be included in the conference proceedings.

PTTI Sessions: PTTI manuscripts will not be peer reviewed. Manuscripts (optional) and/or presentations not representative of the original abstract submitted will not be included in the conference proceedings regardless of whether or not they were presented at the conference, and this may affect the acceptance of future abstracts by the author. Manuscripts and/or presentations will be accepted for conference proceedings through February 5, 2024.

To be included in the conference proceedings:

1. Manuscripts and/or presentations must be uploaded into AMP by February 5, 2024.
2. The submitted manuscript and/or presentation must be representative of the original abstract submitted.
3. The presenting author must be registered for the conference and pay the conference registration fee (in-person and virtual presentations).
4. Video file, presentation file, and media/copyright release form must be uploaded into AMP by January 12, 2024.
5. The presenting author must attend the mandatory speakers' breakfast the morning of their session.

Journal Publication

Authors of appropriate papers are encouraged to submit papers for possible publication in the ION's archival journal, *NAVIGATION* (indexed in the Web of Science). Papers may be submitted at ion.org/navi/submit-navi.cfm.

Exhibit Hall

Exhibit space is available. Booths are sold in 10′ × 10′ increments and include one full complimentary conference registration per booth purchased. For an exhibitor prospectus, or for more information, go to ion.org/itm/exhibits.cfm or contact Megan Andrews at the ION National Office via phone at 703-366-2776 or email at mandrews@ion.org.

Registration Information

All full-conference registrations include technical sessions, conference meal functions and events, and access to electronic proceedings. Registration for tutorials will be an additional fee. Individual registration benefits are non-transferable. Registration fees for registrants staying at the Hyatt Regency Long Beach, that are received and paid by January 3, 2024, start at:

- Member Rate: $1,100
- Non-member Rate: $1,180
- Student Rate: $700
- Virtual-Only Access: $699
- Exhibit Hall Only: $760

Student Conference Registration Grants

Student conference registration grants will be awarded on a "need basis." The registration grant will include a full technical meeting registration to include all conference sessions, meal functions , events, and access to electronic proceedings. Full-time graduate or undergraduate students who are the lead and presenting author of worthy technical paper(s) are encouraged to apply. Grants are limited and are awarded on a first come, first served basis to those meeting the criteria. Prior grant recipients are not eligible. An application must be submitted with an abstract no later than October 4, 2023. See ion.org for details.

Accommodations

Accommodations are offered at the Hyatt Regency Long Beach. A block of rooms has been set aside for conference attendees at the discounted rate of $205 per night for single/double occupancy. These rooms will be available until January 3, 2024, or until the block fills, whichever comes first.

A limited number of government rate rooms for qualified federal agencies are also available. Reservations made after the deadline will be on a space-available basis and may not be at the special ION rate. We encourage you to make your hotel reservations early.

Save $200 on your registration fees by staying at the official conference hotel. All attendees who stay at the Hyatt Regency Long Beach and submit their hotel confirmation number at the time of conference registration will receive a $200 discount when registering for the conference. Hotel discounts will not be applied retroactively.

Make Your Hotel Reservation Today:

- Online at ion.org/itm
- By calling 1-562-491-1234. Be sure to identify yourself as an ION ITM/PTTI attendee to receive the discounted attendee rate.

Co-located ITM and PTTI 2024: ONE Registration Fee, TWO Technical Events and a Commercial Exhibit

ITM SESSION TOPICS

Applications of Multi-GNSS Measurements from Smartphones
Enhanced positioning techniques in smartphones; improved stochastic modeling for GNSS smartphone observables; algorithms and multi-sensor fusion for better indoor, outdoor, and urban-canyon positioning; integration with applications requiring reliable positioning solutions; jamming, spoofing detection and mitigation; use of smartphone raw GNSS measurements for scientific applications, such as geosciences; and smartphone GNSS antenna quality assessment, including antenna phase center offsets and variations.
Chairs: Dr. Robert Odolinski, University of Otago and Dr. Paolo Dabove, Politecnico di Torino

Atmospheric Effects, Space Weather, and Scientific Applications
GNSS-based measures and models of ionospheric and tropospheric effects. Use of GNSS for remotely sensing the atmosphere and Earth's surface. Scientific applications of GNSS. Radio occultation measurements of the troposphere and ionosphere. Ionospheric scintillation. GNSS remote sensing for detecting geophysical events such as earthquakes, tsunamis, volcanic eruptions, and man-made events. Novel scientific applications, as for instance relativistic and gravitational measurements, and dark matter detection with GNSS SV's atomic clocks. Novel scientific applications of GNSS.
Chairs: Dr. Anthea Coster, MIT Haystack Observatory and Shrivathsan Narayanan, German Aerospace Center (DLR)

Autonomous and Safety-Critical Applications
Navigation solutions for assisted and autonomous vehicles and mobile platforms. Integrity monitoring for safety-critical applications of GNSS and other sensors. Assistance and cloud-based technologies for robust and trusted autonomous systems. Guided vehicle systems and pilot assistance with enhanced safety, availability, and efficiency in challenging environments. Safety, integrity, and certification requirements for autonomous navigation and guidance.
Chairs: Dr. Boris Pervan, Illinois Institute of Technology and Dr. Hadi Wassaf, U.S. DOT Volpe National Transportation Systems Center

GNSS Integrity and Augmentation
GNSS augmentation system integrity, fault monitoring, fault detection and exclusion. GNSS faults including satellite and constellation failure modes and external threats including spoofing; anomaly detection. Protection level characterization, testing, and results. Requirements for receiver-based integrity. Augmentation to enhance integrity for improved reliability, safety and efficiency. Dissemination of integrity support information via high and low-capacity data channels. Novel augmentation systems and multi-GNSS solutions. GBAS and SBAS (WAAS, MSAS, EGNOS, GAGAN, SDCM, AGNOS, KASS). Airborne error models. Challenges in the provision of integrity in multi- frequency/multi-constellation services. DFMC airborne error models. High performance and safety critical applications using SBAS, GBAS and ARAIM. Applications include navigation for civil aviation, automotive, UAVs, rail, and maritime.
Chairs: Tim Murphy, Boeing Commercial Airplanes and Ernesto Etienne, Federal Aviation Administration

GNSS Remote Sensing and GNSS-R
GNSS reflectometry for environmental remote sensing of land. Soil moisture retrieval. Flood monitoring. GNSS altimetry. Snow and ice monitoring. Oceanography applications. GNSS-R based on spacecraft, aircraft, UAV observations. GNSS reflectometry for soil moisture retrieval. Advanced GNSS-R for agriculture applications. Combination of GNSS-R with other sensors. GNSS-based wind-speed retrieval. GNSS remote sensing applications for detection of geophysical events.
Chairs: Dr. Cinzia Zuffada, Jet Propulsion Laboratory and Dr. Jihye Park, Oregon State University

GNSS Security: Interference, Jamming and Spoofing
Intentional and unintentional interference detection, characterization, and geolocation. Mitigation and improved robustness techniques against spoofing, jamming, and interference in general. Signal-to-noise ratio characterization in the presence of interference; interference effects on GNSS receiver. Software and hardware solutions, including signal processing and signal authentication. Buck up and complementary PNT technologies. Applications in robust positioning and secure time transfer. Threats modeling and analysis of GNSS disruption events. Spectrum monitoring and localization of intentional/unintentional interference source with ground, airborne, spaceborne receivers. Networks for spectrum monitoring. Use of smartphone GNSS data for spectrum monitoring.
Chairs: Dr. Beatrice Motella, EC/JRC and Dr. Ali Broumandan, Hexagon

Innovative Navigation Algorithms
Algorithms and techniques that exploit network connectivity to assist and improve navigation. Innovative estimation techniques including distributed state estimation, advanced filtering and those which integrate 3D models, landmarks and other information sets. Cloud and crowd-sourced navigation. Algorithms developed for innovative applications as well as a new take on modeling and numerical problems in navigation and positioning. Robust positioning in challenging environments. Collaborative/cooperative positioning algorithms and theories. Application of modern machine learning techniques to navigation. Techniques not traditionally applied to navigation, including deep neural networks, boosting, graphical models, interpretable machine learning, semi- and unsupervised learning.
Chairs: Dr. Heidi Kuusniemi, University of Vaasa and Adyasha Mohanty, Stanford University

Navigation of Unmanned Aerial Vehicles and Other Autonomous Systems
Advanced positioning and navigation for UAV's and other autonomous systems. Navigation solutions for advanced air mobility. Use of novel sensors, sensor fusion, and signals of opportunity. Navigation performance requirements. New approaches for dealing with delayed and out-of-sequence measurements. Sensor and measurement fault detection and exclusion.
Chairs: Dr. Euiho Kim, Hongik University and Adam Shultz, Ohio University

Next Generation Satellite Navigation Technology
Future generation Satellite Navigation Technology; Innovations in satellite constellations. Proposals and methods for interoperability of GNSS constellations. Optimization of GNSS signal structure via codes and data messages. Latest technologies such as extremely stable frequency standards on-board navigation Satellites or intersatellite links. New navigation systems in Low Earth Orbit (LEO). Modernized constellations characteristics and programmatic aspects, ground control and monitoring segments. Performance analysis of new satellites and services. Assessment of RF compatibility, mutual interference, antenna pattern characterization.
Chairs: Dr. Joanna Hinks, Air Force Research Lab and Dr. Roberto Prieto, European Space Agency

PNT Solutions for Space Applications
Navigation system design and implementation for in-space navigation. GNSS space service volume and interoperability; space-grade GNSS receivers for re-entering vehicles. Improved spacecraft positioning using inter-satellite links; satellite laser ranging. Innovative solutions for constellation build-up and maintenance; use of GNSS for orbit and attitude determination as well as precise orbit determination. Moon navigation. Cis-lunar and trans-lunar navigation beyond the Earth's geosynchronous belt. Relative navigation near asteroids and comets. Emerging space positioning applications. Advanced positioning techniques in space, such as snapshot-based positioning on the ground and in space. Interplanetary navigation. Navigation technologies including GNSS, other RF signals, electro-optical systems, and global or local magnetic fields. Enhanced PNT solutions at LEO, GEO, HEO. Use of environmental features and signals (e.g., pulsars), clock aid, and other sensor's integration, cooperative positioning.
Chair: Dr. Alex Minetto, Politecnico di Torino

Precise GNSS Positioning and Applications
Advances in GNSS positioning methods, applications and analysis. Multi-GNSS Precise Point Positioning (PPP), Real-Time Kinematic (RTK), PPP-RTK, network RTK, partial ambiguity resolution. Integer Ambiguity Resolution (IAR) from high precision geodetic-quality and/or low-cost antenna and receivers, including smartphones. Positioning algorithms using space-based augmentation services such as the Galileo High Accuracy Service (HAS). Multi-constellation solutions using single-/multi-frequency geodetic and/or low-cost receivers/antennas (including smartphones). GNSS satellite clock errors characterization and modeling; precise orbit determination for scientific applications. Interoperability of GNSS correction services with different user equipment; robustness against multipath, interference and other local effects. GNSS signals and performance characterization and monitoring. High precision and high integrity applications. Novel applications of precise GNSS positioning. Crustal and structural deformation monitoring including GNSS seismology, atmospheric remote sensing, precision agriculture.
Chairs: Cécile Deprez, German Aerospace Center (DLR) and Dr. Tim Dittman, UNAVCO Inc.

Receiver Design, Signal Processing, and Antennas
GNSS receiver signal processing techniques for improved resiliency in challenging environments including indoor, urban canyons, foliage, scintillation, high-dynamics and under interference. Design of receivers for modernized GNSS signals. Software GNSS receivers. Improved acquisition and tracking sensitivity, robustness and accuracy. Mitigation of multipath and non-line of sight signals. Design and evaluation of GNSS antennas and antenna electronics. Mass-market and low-cost devices. Multi-GNSS receiver's calibration. Multi-GNSS signal simulators.
Chairs: Dr. Jan Wendel, Airbus and Dr. Anurag Raghuvanshi, York University

Sensor-Fusion for GNSS-Challenged Navigation
Fusion of measurements from multiple sensors, data, and information sources for navigation in GNSS-challenged and denied environments. Estimation theories, algorithms, data processing techniques, test methods, and results of new implementations integrating diverse sensors such as GNSS, inertial sensors, odometers, magnetometers, radar, lidar, cameras, barometers, map, infrared, ultrasound sensors, etc. Sensor-fusion with signals of opportunity (SOOP) and non-RF aiding (e.g., vision and lidar) of inertial systems. Urban canyon and indoor navigation, GNSS-denied environment, pedestrian applications, low-cost devices. Modeling of environmental effects on navigation sensors, such as magnetic and gravity models.
Chairs: Dr. Bruno Bougard, Septentrio and Dr. Ananth Vadlamani, QuNav

Ubiquitous Multi-Source Fusion Navigation Technology and Positioning Integrity
Multi-source fusion navigation technology. Use of ubiquitous signals such as 5G, LTE, Wi-Fi and modern Wi-Fi protocols (e.g., Wi-Fi RRT), near-field communication (NFC) devices and other signals in GNSS-denied areas. Use of communication satellites and other satellites signals as signals of opportunity. Alternate and novel radionavigation signals and techniques. Navigation aids, terrestrial transmitters or pseudolites. Solution performance and integrity assessment. High-accuracy position integrity.
Chairs: Dr. Liang Chen, Dr. Hui Liu, Wuhan University and Dr. Li-Ta Hsu, The Hong Kong Polytechnic University

ITM/PTTI Exhibit Hall
Bringing together international leaders in the timing, and related positioning and navigation community in a commercial exhibit.
See ion.org/itm/exhibits.cfm for more information

PTTI SESSION TOPICS

PTTI PRE-CONFERENCE TUTORIALS
- **Optically Derived Ultrastable Microwaves**: Dr. Franklyn Quinlan, NIST
- **NTP/PTP**: Dr. Doug Arnold, Meinberg
- **Synchronization and Coexistence in Quantum Networks**: Ivan Burenkov, NIST
- **Building the Coordinated Universal Time**: Dr. Judith Olson, Infleqtion
- **GNSS**

PTTI KEYNOTE ADDRESS
Dr. Paul G. Kwiat, John Bardeen Chair in Physics and Electrical Engineering, University of Illinois Urbana-Champaign

Activities at National Metrology Laboratories
This session will provide the opportunity for Time and Frequency Laboratories operated at National Metrology Institutes (NMIs) and Observatories to report their innovations in PTTI sectors. This session covers topics related to UTC(k) generation and performance, time dissemination, time services, and calibrations. Measurements aimed at supporting different areas of science, industry, regulatory agencies, and other Institutions will be highlighted.
Chairs: Dr. Giancarlo Cerretto, INRIM and Dr. Roger Brown, NIST

Advanced and Future Clocks
Clocks are needed for timekeeping, navigation, positioning, communication, science, and exploration in both terrestrial airborne and space applications. The development of clocks is driven by technological advances in these areas that push for devices with unique combinations of performance, reliability, robustness, and SWaP. This session considers clocks that offer an advantage over existing clocks with form factors larger than chip-scale atomic clocks. Presentations may be on any type of advanced clock in its present or future form. Examples of these clocks include: hot and cold atom clocks, ion/molecular clocks; microwave, terahertz and optical clocks, optical frequency combs, and cavity stabilized ultra-stable lasers; cryogenic sapphire oscillators; and optically pumped clocks.
Chairs: Dr. Franklin Ascarrunz, SpectraDynamics and Dr. John Elgin, Air Force Research Laboratory

Environmental Sensitivity of Clocks and Timing Systems
The release of the IEEE 1193 "Guide for Measurement of Environmental Sensitivities of Frequency Standards" provides an opportunity to improve the accuracy, relevance, and usability of specifications for oscillators and timing systems. IEEE 1993 provides clear definitions and distinction between total sensitivity over a parameter range and linearized sensitivity coefficient over a defined range. Where most manufacturers have historically provided only peak-to-peak total sensitivity, the publication of sensitivity coefficients will provide systems' designers and integrators with heretofore unavailable input to accurately model system performance in environmentally dynamic environments. This session encourages submissions presenting IEEE 1193 influenced measurements of clocks and timing systems, comparisons of Total Sensitivity measurements with Sensitivity Coefficients, and demonstrations of system modelling and integration.
Chairs: Dr. Robert Lutwak, Microchip and Dr. Zachary Warren, The Aerospace Corporation

GNSS Systems Timing Architectures and Capabilities
Timekeeping is the heart of GNSS, and maintaining it requires a complex system with elements in the space, control, and user segments. This session will focus on how present and proposed GNSS constellations maintain time and frequency, and how they provide users with a robust position, navigation, and timing signal. Papers presenting innovative concepts for architectures and timing algorithms in LEO, MEO or Cis-Lunar constellations, as well as reviewing little known details of existing infrastructure, are welcome. The session is especially interested in the diverse representation of the practical or theoretical usage of GNSS timing in any field.
Chairs: Dr. John Janis, L3Harris and Calvin Lin, TL

LEO Satellite Timing Requirements and Applications
The advent of proliferated Low Earth Orbit (pLEO) systems enables the realization of effective LEO-based time transfer. In pLEO systems, low-cost small satellites and commensurate access to space allows the rapid fielding of constellations with hundreds of space vehicles (SV). Architectures featuring meshed inter-satellite links allow for the near-immediate propagation of timing corrections to SV clocks, supported by two-way inter-satellite ranging. This also enables robust and resilient terrestrial navigation. The session will capture recent work using pLEO for space-based time transfer to terrestrial user systems. We invite both commercial and defense oriented space systems to submit papers. Key performance characteristics might include maintaining accuracy when access to UTC is not available, either via GNSS or via space-to-ground links, and reaching ps level time transfer stability.
Chairs: Greg Weaver, JHU/APL, SDA and Dr. Chris Erickson, US Space Force (Acq. & Int.)

Low-SWaP Clocks and Oscillators for 5G and Beyond
Low-size, weight, and power (SWaP) clocks and oscillators are critical components for commercial and military applications. The telecom industry has moved toward tighter timing requirements on each antenna in the last decade. Mobile and non-wired devices combine the need for precise absolute timing with power and form factor restrictions based on application. Military timing needs include communication and navigation aids for the mobile soldier as well as for applications requiring extreme temperature, shock, and vibration robustness. This session will discuss the state-of-the-art in low-SWaP, handheld and non-wireline clocks and oscillators, for DoD and telecom applications.
Chairs: Dr. Roozbeh Tabrizian, UF and Dr. Ginel Hill, SiTime

Methods and Algorithms for Timing Applications and Timescales
Mathematics and statistics play important roles in clock analyses and timing applications from the classical two-sample variance to advanced filtering techniques. This session seeks contributions on mathematical developments that help to analyze clock measurements, handle data anomalies, compute statistics in the presence of missing observations, generate timescales, and/or facilitate time transfer or dissemination. Algorithms presented can support any timing-related activity from local oscillator performance to long-range timing applications. New algorithms or new applications using existing algorithms are of particular interest, including machine learning for timing applications, timescale algorithms that include optical clocks, and algorithms for timekeeping in space such as lunar timescales.
Chairs: Dr. Christine Hackman, US Naval Research Laboratory and Dr. Jian Yao, UCAR/NCAR

Present and Future Clocks for Space
Abstracts are encouraged that discuss next-generation space clock technology as well as science missions that rely heavily on the design, development and performance of clocks presently operating in space, or planned for near-term operation in space (LEO, MEO, GEO and deep-space). For space, challenges of Size, Weight and Power (SWaP), reliability, radiation hardening, and longevity are often more crucial for clock design than clocks solely aimed at terrestrial applications. All types of space clocks are of interest: space-qualified crystal oscillators, warm-vapor lamp or laser optically-pumped clocks, chip-scale clocks, cold-atom clocks, ion-clocks, optical lattice clocks, and any other clock technologies that can contribute to space-system timekeeping and navigation as it relates to both 21st century infrastructure and scientific missions that advance human knowledge.
Chairs: Dr. James Camparo, The Aerospace Corporation and Dr. Thejesh N. Bandi, The University of Alabama

Time and Frequency Transfer Supporting 1E-18 Clock Comparisons
Precise timing is critical for operations including positioning, navigation, and timing for networks and telecommunications. Despite its ubiquity and reliability, GNSS may not be available everywhere or provide the sufficient accuracy in all times. More specifically, new methods are necessary to be able to compare optical clocks with frequency accuracy in the 1E-18 range. This is furthermore important in view of the future redefinition of the second, for which the frequency comparison of clocks at the 5E-18 level is a mandatory criterion. Improved time and frequency transfer are becoming more relevant in this context, utilizing both RF and optical technique. From two-way free-space microwave links to optical fiber or free-space links, this session will include presentations on the newest methods in the synchronization and syntonization of remote clocks in space, from space to ground, between ground stations, and potentially underwater.
Chairs: Dr. Giulio Tagliaferro, BIPM and Dr. Tetsuya Ido, NICT

Time Transfer Over Comms and Unconventional Methods
Traditional RF time transfer using point to point signals or one-way through GNSS uses either a GNSS receiver or a purpose-built time transfer modem. In this session we explore alternatives to traditional methods in the vein of the convergence between time and frequency transfer and existing or emerging communication systems. In addition to timing over comms systems, we're also interested in exploring submissions that cover unconventional means of transferring time and frequency using naturally occurring phenomenon, non-traditional communication channels, or other novel techniques.
Chairs: Dr. Nathan Barnwell, NIWC Pacific and Carsten Rieck, RISE

NEW! Timekeeping for Quantum Networking and Other Science Applications
Precise timing is a critical requirement for emerging quantum networks and related science applications. However, these applications exhibit a wide range of timing requirements, with some relying on post-processing for timekeeping while others necessitate stringent synchronization of photon-arrival times at receiver nodes for advanced quantum communication tasks. We invite submissions that highlight the timing requirements of future quantum networks and other novel scientific applications. Of special interest are experiments and applications that may currently be constrained by traditional time transfer methods. We welcome contributions related to terrestrial, as well as space-based networks, with a primary focus on their timing needs. Synchronization concepts that address the unique challenges of time transfer for quantum experiments are also of interest. The goal of this session is to foster dialogue between the timing community with well-established timing concepts, and the broader scientific and quantum network communities.
Chairs: Dr. Antia Lamas-Linares, AWS Center for Quantum Networking and Dr. Alexander Lohrmann, Jet Propulsion Laboratory

NEW! Updates from Regulatory Agencies and Institutions Working with NMI's
Time and Frequency (TF) metrology is not limited to National and Designated Institutes, but has a global impact across diverse areas of science and industry. This session will present recent developments related to the domain of TF in various international organizations, specifically focusing on aspects that enhance and improve the utilization of UTC and SI second. We invite organizations such as the BIPM, IERS, IAU, IGS, IGU, ITU, ISO, ETSI, IEEE, CNES, NASA, ESA, ASI and others to inform the audience about their activities and impact on users in the time and frequency field. We invite speakers to address the standardization and calibration issues for topics such as leap second implementation, adoption of optical clocks, high precision network synchronization, as well as to present on the advancement of timing in astronomy/astrophysics, geodesy, and fundamental physics.
Chairs: Dr. Marina Gertsvolf, NRC and Edoardo Detoma, Consultant