Commission J

Session Code	Title	Convener names	Number of slots
J01	**New telescopes and major upgrades to existing facilities**	Francois Kapp, Douglas Bock, Maria Grazia Labate	25

Description: A new era of astronomical discovery is unfolding, fuelled by next-generation instruments and groundbreaking upgrades to existing facilities and observatories. This session showcases new cutting-edge telescopes, state-of-the-art instrumentation, and transformative enhancements that are pushing the boundaries of observational capabilities and opening new frontiers for more advanced exploration of the universe across a wide range of scientific domains.

Session Code	Title	Convener names	Number of slots
J02	**VLBI**	Agnieszka Slowikowska, Anna Bartkiewicz, Mohamed Darwish	20

Description: Very Long Baseline Interferometry (VLBI) has entered a transformative era in recent years. By providing the sharpest view of the Universe, it is revolutionizing research in diverse fields such as the transient universe, black hole physics, galactic dynamics, and astrometry. The Global Millimeter VLBI Array and the Event Horizon Telescope are pushing the boundaries of high-frequency, high-resolution observations, while the International LOFAR Telescope demonstrates the power of VLBI at MHz frequencies. South Africa's MeerKAT radio telescope has recently joined the EVN, significantly enhancing both resolution and sensitivity and opening new avenues for discovery. The next-generation facilities such as the SKA and ngVLA will bring unprecedented sensitivity, multiple-beam capabilities, and wider fields of view.

This session will explore how the community is addressing the challenges and opportunities of "Next Generation VLBI" through advances in broadband and ambient-temperature receivers, improved calibration techniques, enhanced data transport and processing, and global network expansion. Contributions will also highlight operational aspects, including international coordination within the framework of the emerging Global VLBI Alliance, which aims to ensure efficient collaboration and long-term sustainability. The session will also emphasize synergies with upcoming large-scale facilities, the role of VLBI in multi-messenger astronomy, and strategies to secure the sustainable future of the global VLBI network.

Session Code	Title	Convener names	Number of slots
J03	**Radio Astronomy from Space: Science, Technology and Future Missions**	Yuri Kovalev, Cristina Garcia-Miro, Gabriele Bruni, Joseph Lazio	10

Description: Radio astronomy has enabled many of the most important discoveries in modern astrophysics, including pulsars, relativistic jets, and imaging of supermassive black holes. Ground-based observations, however, are fundamentally limited: baselines cannot exceed the Earth's diameter, the ionosphere blocks frequencies below ~10 MHz and complicates those above ~200 GHz, and radio frequency interference increasingly hampers observations. Space-based radio astronomy overcomes these barriers, providing access to previously inaccessible frequency ranges and enabling interferometric baselines far beyond Earth. Past and current missions such as TDRSS, VSOP/HALCA, RadioAstron, NCLE, and LOVEX have demonstrated a range of capabilities -- from space VLBI to pioneering ultra-low-frequency observations below 80 MHz -- highlighting the feasibility and scientific promise of space-based radio astronomy.

In the coming decade, a new generation of ambitious projects is under development. These include:

- Black Hole Explorer (BHEX), Event Horizon Imager (EHI / SHARP), and Millimetron, targeting black hole physics at mm and sub-mm wavelengths;
- Chinese initiatives such as Space Millimetre-wavelength VLBI Array (SMVA) and Cosmic Microscope (CM), aiming at mm/cm/dm-wave space VLBI;
- Ultra-low frequency projects such as ALO, OLFAR, DSL, FARSIDE, and FARVIEW, designed to probe the Dark Ages, the Cosmic Dawn, and exoplanetary radio emissions;
- Solar and heliospheric missions such as SunRISE, focused on coronal mass ejections and space weather.

This session will bring together representatives from these missions and the broader community to present the latest progress, discuss scientific opportunities, and highlight the technical challenges of space-based radio astronomy. Lessons learned from the past missions will be covered, along with synergies with next-generation ground facilities such as the SKA and ngVLA. A dedicated discussion will follow the presentations, focusing on synergies and coordination between international efforts. The aim is to identify shared scientific priorities, potential collaborations, and strategies to maximize the scientific return of upcoming space-based radio astronomy initiatives. Topics of Interest include but are not limited to:

- Science drivers for space-based radio astronomy (black holes, relativistic jets, cosmic dawn, exoplanets, transients, scattering, solar and space weather studies)
- Current and future space VLBI missions at cm to sub-mm wavelengths
- Lunar- and orbit-based interferometers for ultra-low-frequency astronomy
- Technological developments: antennas, receivers, deployment, data transmission, correlation
- Synergies with ground-based observatories (SKA, ngVLA, EHT)
- International coordination and collaborative opportunities

Session Code	Title	Convener names	Number of slots
J04	**Time-domain radio astronomy**	Kejia Lee, Jayanta Roy, Maura Pilia	10

Description: Description: We plan to cover the full fast-radio-transient landscape, from sources at Galactic distances such as pulsars, Rotating Radio Transients (RRATs), magnetars, giant pulses, long-period pulsars, long-period radio transients (LPTs), to sources at cosmological distances, such as Fast Radio Bursts (FRBs). Their high brightness temperatures and short durations point to coherent emission from compact regions. While Pulsars provide a valuable means for probing the most extreme states of matter, the extremely bright millisecond-duration events from FRBs are examples of one of the most extreme coherent radio emissions in the Universe probing the ionization, densities, and magnetic properties of plasma on a cosmological scale.

This entire population spans timescales from milliseconds to several minutes and hours, covering a broad energy range bridging coherent and incoherent regimes. It has the potential to graze the boundary between coherent and incoherent emitters, challenging the understanding of coherent versus incoherent radio emissions and the need to expand the parameter space of upcoming surveys. Even after significant efforts from large-scale surveys populating the transient sky on the luminosity-pulse timescale diagram, there are still many gaps in the parameter space. The gaps are mostly due to survey design challenges in probing the fast transient population at ultra-short and ultra-long timescales.

In this session, we aim to explore the latest advancements that deepen our understanding of the time-domain Universe, focusing on scientific and technological progress, ongoing improvements in detection sensitivity, advanced data processing techniques, and AI-driven data science—all of which are enhancing our ability to discover and study these mysterious cosmic events.

Session Code	Title	Convener names	Number of slots
J05	**Wide-field radio astronomy and survey science**	Michael Kriele, Isabella Prandoni, Betsey Adams	20

Description: Wide-field radio astronomy has now firmly entered the era of large-scale surveys and transformational discoveries. Pathfinders and precursors such as ASKAP, MeerKAT, LOFAR, MWA, and uGMRT have delivered deep, wide-area maps of the radio sky, uncovering millions of new sources and revealing unexpected structures such as odd radio circles, new supernova remnants, and giant radio galaxies. At the same time, major survey projects (EMU, WALLABY, MALS, LoTSS, GLEAM-X) are producing second-generation data releases that combine sensitivity and sky coverage at unprecedented levels. These advances have already enabled precision cosmological measurements and the discovery of rare classes of faint, extended sources.

Technological development in radio astronomy is accelerating. Upgrades such as LOFAR2.0, MeerKAT+, and new phased-array feeds at Parkes and ASKAP are significantly expanding both field of view and frequency coverage. Meanwhile, emerging facilities like the DSA-2000 are being designed as purpose-

built survey engines. Collectively, these advancements are laying the groundwork for the SKA and ngVLA, ensuring a smooth scientific and technical transition into the next decade of radio astronomy.
We aim to bring together researchers bridging engineering and astrophysics to discuss the optimal exploitation of these wide-field surveys, the lessons from ongoing upgrades, and the future perspectives on survey design and technology. The key points that the session will address are:

- Scope, depth and design of ongoing or planned wide-area radio continuum and spectral line surveys, and their emerging scientific results
- Progress in time-domain surveys using wide-field multi-beaming in a survey context
- Observing and analysis strategies for exploiting large-area datasets, including new wide-field imaging methods
- New wide-field radio astronomy technology, including upgraded receivers, correlators, phased-array feeds, aperture arrays, and dedicated survey facilities

Session Code	Title	Convener names	Number of slots
J06	**(sub)millimetre astronomy**	Li Jing, Luca Olmi, Mohamed Darwish	15

Description: Radio-astronomy at millimeter and sub-millimeter wavelengths has made remarkable advances in recent years. Existing single-dish telescopes and arrays are being continuously upgraded, while new telescopes and instrumentation are being developed to provide ever wider fields of view, test new observing techniques and push into the THz region. This session welcomes descriptions of telescopes, instrumentation, techniques, and novel technologies for (sub)millimeter-wave radio astronomy.

Session Code	Title	Convener names	Number of slots
J07	**Front-end systems**	Jin Fan, Maria Kovaleva, Paulo José de Aguiar Simões	25

Description: This session focuses on the latest advancements and emerging research in antenna and receiver technologies for next-generation radio astronomy front-end systems. Key challenges include achieving unprecedented levels of sensitivity, wide frequency coverage, large field of view (FOV), and robust resilience against growing radio frequency interference (RFI). We invite contributions highlighting innovations across the entire signal chain—from low-noise amplifiers, filters, and feed structures to cost-effective antenna designs for large-N arrays. Topics of interest also encompass computational electromagnetics for modeling and optimization, experimental characterization techniques, system calibration methods, and signal processing solutions for enhanced dynamic range and RFI mitigation. Studies demonstrating novel materials, cryogenic receivers, photonic technologies, and AI-assisted design and calibration approaches are especially welcome. This session aims to foster discussion among researchers and engineers on integrating component-level advances into high-performance, system-level solutions for current and future radio telescopes.

Session Code	Title	Convener names	Number of slots
J08	**Real-time processing systems**	Andrew Van Der Byl, Morag Brown, Danny Price	20

Description: Next generation radio telescopes require wider signal processing bandwidths, faster data transport, and shorter processing timeframes while operating on reduced power budgets. To satisfy these demands, fast data interconnects and higher-throughput processing platforms are needed, as well as improvements in algorithmic implementations to make newer instruments a reality.

The session for real-time processing for Radio Astronomy (RA) include:

- High performance digital signal processing instrumentation for radio astronomy, e.g. correlators, beamformers, spectrometers, pulsar and FRB machines, and real-time RFI detection, identification and mitigation
- Hardware and software for these digital backends (FPGA, RFSoC (including AI engines), GPU, CPU, SOM, ADC boards)
- Software and hardware for high bandwidth data transport (e.g. transporting data over Ethernet to GPUs)
- Novel algorithms or techniques for real-time signal processing
- Energy efficiency studies and optimization techniques
- Architectures and development tools for all of the above
- Educational resources and tools for entry to real-time processing system development

Session Code	Title	Convener names	Number of slots
J09	**Post-correlation signal processing: Big Data and AI**	Stefan J. Wijnholds, Anna Scaife, Maxim Voronkov, Miguel Garcamo	25

Description: Current and future radio interferometers (LOFAR, ASKAP, MeerKAT, ALMA, GMRT, EVLA, DSA-2000, SKA) truly make interferometric data processing a Big Data challenge. It becomes essential to process the data on a supercomputer in a distributed fashion. To overcome these challenges, specialised software is required that either adapts existing algorithms to improve their scalability and computational efficiency or introduces completely new approaches with those based on machine learning as a prime example. Some of these new algorithms and approaches are only becoming practical now, given the advances in computing hardware (the amount of memory, solid state disks, etc), but it is still not uncommon for the software or the computing platform (or both) to be the main limiting factor for the science, which can be obtained from the given dataset. The large volumes of data also imply data processing using automated pipelines with minimal human interaction and increasing use of ML/AI methods. Fine-tuning pipelines and algorithms to achieve the required efficiency (both in terms of the quality of the result and the time it takes to obtain it) poses additional challenges given the vast parameter space. It is, therefore, timely to share practical experience reducing modern radio astronomical data and discuss steps towards the future facilities.

Key topics of this session include:

- calibration, imaging and analysis algorithms and their (energy and computationally) efficient implementations
- AI in synthesis imaging and data analysis, include assessment of machine learning methods in terms of uncertainty quantification and explainability
- Agentic AI for facilitating complex post-processing workflows
- scientific data processing at scale
- pipeline operations and automation
- distribution frameworks and data processing on a cloud

Session Code	Title	Convener names	Number of slots
J10	**Latest news and observatory reports**	Stefan J. Wijnholds, Yashwant Gupta	15

Description: For this session, we welcome updates from radio observatories around the globe. As this is intended to be an informative session, prospective contributors need only submit an abstract sketching what will likely be presented during the session but are free to submit a summary paper if they would like to provide a more detailed update in the proceedings of the conference. This session also provides a forum for contributions that do not fit in one of the other sessions. A portion of the session will be kept clear for late-breaking results. A call for these will be made to the Commission J community just prior to the meeting.

Joint sessions led by Commission J

Session Code	Title	Convener names	Number of slots
JG	**Mutual benefit between radio astronomy and ionospheric science**	Maaijke Mevius, Rebecca Ghidoni, Leszek Błaszkiewicz	10

Description: The ionized atmosphere has a significant impact on the propagation of radio waves, which can lead to the misinterpretation of data in radio astronomical observations. Consequently, astronomical research involving radio waves collected from the ground, particularly at lower frequencies (such as those used by LOFAR/MWA and, in the future, SKA), must account for current atmospheric conditions. Conversely, disturbances in radio signals can also provide valuable insights into the morphology and dynamics of the ionosphere. Radio astronomical observations are often sensitive to small-scale ionospheric disturbances, ranging from hundreds of meters to hundreds of kilometers in size, and from seconds to minutes in duration.

To foster a stronger connection between the ionospheric and radio astronomical scientific communities, this session invites contributions that promote the exchange of knowledge regarding the current state of both fields and their future needs. Contributions are encouraged from both communities:

- Scientists studying the ionosphere, especially those conducting climatology studies, examining small-scale disturbances like TIDs and scintillation, or investigating unusual ionospheric behaviours during extreme events.

- Scientists working in radio astronomy who need to mitigate or eliminate ionospheric effects from their measurements, or who can contribute to a deeper understanding of ionospheric physics through their research.

Session Code	Title	Convener names	Number of slots
JAC	**Cosmological HI: observations and precision calibration**	Abhirup Datta, Xuelei Chen, Demetrios Matsakis, Kumar Vijay Mishra	20

Description: Observations of redshifted 21cm signal from neutral hydrogen (HI) is the most promising probe for the early Universe, through the study of Dark Ages, Cosmic Dawn and Epoch of Reionization, and also complementary to optical observations at the post-reionization Universe. This session will be dedicated to:

- the latest cosmological 21-cm experiments from the ground (e.g., EDGES, SARAS, REACH, HERA, LOFAR, MWA, NenuFar, Tianlai, uGMRT, SKA, etc.)
- synergy science with multi-wavelength observations of high-redshift galaxies (e.g., JWST, Euclid, Rubin-LSST, etc)
- upcoming space-based experiments like Farside, ALO, DSL, Pratush, SEAMS, etc.

This session is expected to have presentations involving a mix between theory, simulation, data analysis, and instrumentation.

The success of these precision cosmological experiments relies on the radio instrumental calibration, high accuracy characterization in the antenna and receiver response, and radiation pattern measurements. This session will emphasise on the necessity of such calibration and measurements including related instrumental developments. To cater to this highly demanding field of precision instrumentation, this session invites submission in related radio instrumentation and precision measurements in related frequency range.

Session Code	Title	Convener names	Number of slots
JA	**Precision timing and synchronisation**	Brent Carlson, Carlo Carobbi, Bill Shillue	6

Description: Coherent capture of the wavefront from the radio source, i.e. synchronization and timing, however achieved, is critical for radio telescope arrays. Methods to achieve such drives array signal transport methods, signal processing design, array science performance, cost, power, and even feasibility of an array. In this session we invite papers on a range of methods implemented, under development, or proposed to achieve coherence for a range of telescopes from MHz to hundreds of GHz. We are additionally interested in methods implemented, lessons learned and, as importantly or even more important, methods that were tried and didn't work, or didn't achieve required performance. We also are interested in papers proposing or envisioning new arrays, their timing requirements and challenges, and how breakthroughs in new timing methods, or equivalent, might enable them and their science performance.

Session Code	Title	Convener names	Number of slots
JC	**SETI**	Andrew Siemion, Karen Perez, Mike Garrett, Kumar Vijay Mishta, Taner Şengör	10

Description: The last decade has transformed our understanding of the prevalence of habitable environments in our Galaxy, heightening the scientific imperative to search for evidence of life beyond Earth. The search for technosignatures—evidence of technology developed by extraterrestrial intelligence—represents a direct, empirical test of this profound question. This session will explore the cutting-edge instrumentation, algorithms, and observational strategies defining the modern SETI era.

We invite contributions on all aspects of modern technosignature searches, with a special focus on:

- Observational results from ongoing and new radio campaigns.
- Advanced digital instrumentation and real-time processing architectures.
- Novel algorithms, including machine learning and deep learning, for technosignature discovery and anomaly detection.
- High-throughput data pipelines and techniques for streaming signal analysis.
- Wideband, wide-field surveillance strategies and spatio-temporal signal analysis.
- Advanced techniques for Radio Frequency Interference (RFI) characterization, excision, and geolocation.
- Methods for complex signal characterization and classification.
- Concepts for distributed sensor networks and multi-modal technosignature searches.

Session Code	Title	Convener names	Number of slots
J-IAU	**70 years of radio astronomy in Finland, Latvia, Poland and Ukraine**	Leonid Gurvits, Andrzej Kus	6

Description: This half-day session will be dedicated to the history and prospects of radio astronomy developments in the region, with particular reference to the country hosting the URSI GASS 2026. Such "domestically" focused sessions have been held at several previous URSI General Assemblies (as well as IAU General Assemblies) and have consistently attracted the interest of delegates, often having broad appeal and including individuals not professionally linked to radio astronomy. Materials from similar past sessions (video/audio recordings and slides) are publicly accessible via the WGHRA website: https://rahist.nrao.edu

Radio astronomy in the four countries listed has played an important role in strengthening the position of science in societal development. The radio astronomy facilities and institutes in these countries have made significant contributions to global radio astronomy. This session will help to consolidate historical knowledge as a foundation for the future development of radio astronomy in the region.

Joint sessions involving Commission J led by other Commissions

Session code	Title	Convener names	Number of slots
EBCFJ	**Spectrum management and Utilization**	Flávio Miguel da Silva Jorge, Paolo de Matthaeis, Tasso Tzioumis, Satheesh Bojja Venkatakrishnan, Kumar Vijay Mishra	
Description: This session focuses on spectrum management and utilization by all radio services and applications, including by science-related ones, as well as by emerging technologies and concepts. In this scope, all contributions related to either spectrum policy, planning, engineering, including spectrum sharing and coexistence between either existing and/or future technologies and emerging concepts, stations licensing and market access, spectrum monitoring and interference detection, interference reports, law enforcement, standardization, and other challenges related to spectrum sharing and coexistence, are welcome.			

Session code	Title	Convener names	Number of slots
EFJ	**RFI Detection, Characterization and Mitigation in Remote Sensing and Radio Astronomy**	Flávio Miguel da Silva Jorge, Paolo de Matthaeis, Tasso Tzioumis	
Description: Description: Radio Frequency Interference (RFI) is having an increasingly detrimental impact on both passive and active microwave remote sensing. Interference can corrupt measurements collected by microwave instruments and reduce the ability of retrieving relevant geophysical measurements over many regions of the Earth. RFI is also a serious problem for radio astronomy, since it can severely degrade the quality of the data and even damage sensitive receivers. This session will present interference detection, characterization and mitigation techniques, as well as the latest reports of RFI observed by microwave radiometers, active microwave remote sensing instruments and radio telescopes.			

Session code	Title	Convener names	Number of slots
EFGJ	**Machine Learning and Signal Processing to Analyze and Mitigate EMI and RFI**	Kaushal Buch, Virginie Deniau, Paolo de Matthaeis, Riccardo Trinchero, Kevin Vinsen	
Description: Contemporary techniques for characterizing and mitigating EM and RF interference primarily use signal processing as their basis, with machine learning now starting to appear in experimental systems. These tools have found use in the modelling and mitigating interference of different kinds, in a variety of systems. This session would cover the latest developments in the areas of machine learning, deep learning and signal processing for interference characterization, classification, and mitigation. The session also seeks papers on challenging applications where the use or the potential use of these techniques could significantly reduce the effects of interference.			

Session Code	Title	Convener names	Number of slots
HJ	**Radio observations and diagnostics for the Sun, heliosphere and space weather**	Mauro Messerotti, Pietro Zucca, Yihua Yan, Nat Gopalswamy, Divya Oberoi	

Description: The Sun, the Heliosphere, and magnetised planets in the solar system generate space weather perturbations through various plasma processes. These processes produce signatures observable in the form of intense radio emissions from non-thermal and thermal electrons. Understanding these signatures is crucial for advancing heliospheric physics, and developing space weather science and operational models. This session invites contributions on recent observations of solar and heliospheric radio emissions. Topics include radio observation techniques, emission and propagation modelling, and radio diagnostics for space weather. We encourage submissions related to instrumental work on full Stokes interferometric calibration and imaging, and coordinated multi-point observations from ground-based radio telescopes (e.g., LOFAR, MWA, MeerKat, LWA, EOVSA, NenuFar, MUSER, etc.), spacecraft plasma/wave experiments (e.g., STEREO, Solar Orbiter, Parker Solar Probe) as well as imaging experiments in X-ray, EUV bands and WL coronagraphs onboard various spacecrafts. Presentations may focus on modelling, statistical or individual case studies, and techniques for investigating remote magnetic fields and electron density in regions such as the solar corona, interplanetary medium, and magnetised auroral regions. Additionally, the use of solar radio bursts to interpret particle acceleration sources such as CME-driven shocks and flare reconnection regions will be discussed.

Session Code	Title	Convener names	Number of slots
HGJ	**Panel Discussion for Early Career Researchers**	David Hartley, Bruce Fritz, Mohamed Said Darwish	2 hours (6 20min slots)

Description: The fields of plasma waves, space weather, ionosphere, and planetary emissions have developed greatly in the past decades. As new topics start to develop, early-career scientists can find it hard to identify new interesting questions to investigate and new ways to innovate in the field. In this session, we invite a panel of renowned researchers to give their opinions on how the research field has evolved since they started their careers, and what are key questions for the future of space physics. They will also discuss their personal experiences, accomplishments, and disappointments in order to enable early-career scientists better appreciate the difficulties of scientific research. This is an excellent opportunity for early-career scientists to meet with experts and discuss the present, future, and challenges within our fields within a friendly environment.