



Dear colleagues, partners, and friends of HARMONY,

Welcome to the ninth edition of the HARMONY project newsletter! As we return from the summer break, our researchers are entering a decisive stretch, finalizing results and advancing publications. The final year of HARMONY is now in full swing, and the achievements of our shared journey are becoming increasingly visible. This is a moment not only to consolidate our scientific advances, but also to place HARMONY in the wider European context, where research, innovation, and collaboration contribute directly to the ambitions of the EU Space Act and to Europe's vision for a resilient, sustainable, and competitive space economy.

[Visit our website to know more about the HARMONY PhDs!](#)

Retrospective

Giulio Orlando and Aymeric Cailleux recently completed the ESOA Active Antenna Training at ESA ESTEC from September 15th to 19th, covering the full chain of active antenna design for satellite applications, from element modelling and MMICs to system architectures, beamforming strategies, and industrial implementations. The programme blended theory, design, and hands-on examples, with a strong focus on multibeam, active, and digital beamforming techniques directly relevant to next-generation SATCOM payloads.



In addition, Giulio Orlando and Oscar Martínez attended the AESS International Summer School on Frontier Technologies for "Space 2.0" Communications from September 1st to 5th. The school explored cutting-edge topics including 6G NTN, space softwarization, space traffic management, and software-defined radio for satellites, with dedicated sessions on satellite networking in 5G and beyond, extra-terrestrial navigation, and EHF-band communications. It concluded with emerging perspectives on space quantum communications, outlining promising directions for the field.

Finally, Azra Batool participated in the EURASIP Seasonal SatNEx School 2025, an international forum on the latest trends in space communications and security with a special emphasis on cislunar and lunar environments, from September 22nd to 23rd. The programme gathered experts on next-generation communications and NTN in the 6G era, and, organised in conjunction with ICSSC 2025, featured panels on standards, security, quantum technologies, and AI applied to space, strengthening cross-disciplinary insight for future missions.



Journal milestone: Oscar Martínez's journal paper "Distributed Array-Based Approach for Scalable Feeder Links in LEO Constellations" was accepted for publication in IEEE Transactions on Aerospace and Electronic Systems. The work advances distributed ground segment architectures to support large LEO constellations, reinforcing HARMONY's contributions to high-capacity, resilient satellite networks. In connection with this achievement, Oscar Martínez shared his reflections on his experience within HARMONY in the section "Voices of HARMONY".

Voices of HARMONY



My experience in the HARMONY project has been deeply rewarding. I have had the privilege of working with knowledgeable and dedicated researchers at the three institutions I joined: Universität der Bundeswehr München, Heriot-Watt University, and Thales Alenia Space France. The guidance and collaboration of my supervisors have been fundamental to the progress of my research on feeder links. The quality of the resulting publications and the ongoing patents stand as a direct reflection of this fruitful teamwork.

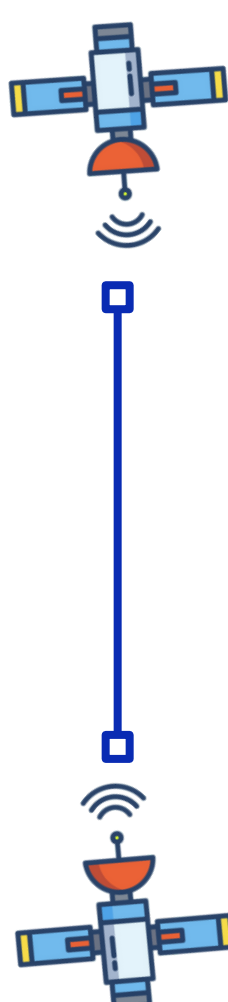
I firmly believe that the work we carried out within the HARMONY project extends beyond the generation of knowledge. It provides a vision for a more efficient and sustainable space industry, going beyond raw performance as the sole objective.

Furthermore, the opportunity to be part of three research groups across three different countries has been an invaluable experience, both academically and personally. Engaging with diverse research environments and cultures has broadened my perspective and contributed greatly to my professional development and personal growth.

Oscar Martínez - PhD Candidate

Commitment

HARMONY's research is closely aligned with the ambitions of the EU Space Act, which seeks to strengthen Europe's resilience, sustainability, and competitiveness in space. By advancing federated and fractionated satellite architectures, adaptive antennas, digital twins, and distributed data handling, we are contributing to the development of secure and sustainable infrastructures for the next generation of European space systems. These innovations also support broader EU priorities, from the green transition to digital sovereignty, ensuring that engineering advances remain connected to societal needs. In this way, HARMONY demonstrates how European research excellence can directly shape the future of strategic space technologies.



Looking beyond the project, HARMONY has also been a catalyst for innovation and collaboration. Several results are progressing toward patents, and the partnerships established will carry forward into SPARE (Space Responsible), HARMONY's successor project. SPARE will expand the focus toward telecom in-orbit capacity, spectrum management, safety and security, and eco-design, while also addressing the intersection of space law and technology. In this way, HARMONY is not an end, but the first step in a longer journey, providing the impulse for Europe's strategic vision of a competitive, responsible, and forward-looking space economy. This continuity ensures that the momentum created within HARMONY will actively foster Europe's leadership in the New Space Economy.

"Advancing the EU Space Act by empowering next-generation space telecommunications, through collaboration, creativity, and purposeful research."

Looking Ahead

Now in its concluding year, HARMONY is moving from build-up to delivery, closing core studies, turning findings into publications, and advancing doctoral milestones toward submission. The final conferences will bring results to the European and global stage, catalyse dialogue with industry and institutions, and deepen collaboration. In parallel, we're translating outcomes into impact: energising Europe's space economy, reinforcing a strategic telecom vision, and sustaining the excellence, competitiveness, and innovation of European research.

We wish you a productive and inspiring autumn!

Kind regards,

The HARMONY Team

Thank you!

