CLUE-H

EUROPEAN CLUSTER
EMF AND HEALTH

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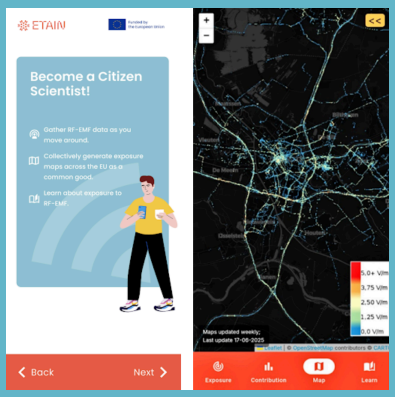
CLUE-H in Action: Research Highlights and New Developments in EMF and Health

ETAIN

ETAIN 5G Scientist App – Mapping Exposure to radiofrequency electromagnetic fields

ETAIN developed an app together with the public: the 5G Scientist app measures exposure to radiofrequency electromagnetic fields (RF-EMF) from mobile networks and WiFi. It is freely available for Android phones. The app collects signal quality indicators (e.g., RSSI, RSRP) and location information. These are used to estimate exposure from RF-EMF.

A key feature of the app are the exposure maps, which can be checked online and in the app, allowing users to see how RF-EMF levels vary across space.



Want to get involved? Scan the QR code to download the app and join as a citizen scientist.

Download the app

RF-EMF and insects – big questions for small creatures

In ETAIN, an indoor experiment determines if RF-EMF at 3.6 GHz has an effect on bees' developmental time and behaviour. In parallel, a field study aims to investigate the biodiversity of insects and pollinators in particular, as well as the behaviour and fitness of bees (honey bees and solitary bees) under 3.6 and 24 GHz exposure of antenna in the field, in the surrounding 500 m area.

Learn more

SEAWave

Fraunhofer ITEM Wins Best Poster Award for 5G Genotoxicity Research

A poster from the team of Fraunhofer ITEM, a partner of SEAWave, on the effects of 5G mobile telephony on primary skin cells was honoured with the Best Poster Award at the 10th German PharmTox Summit 2025 which took place in Hannover (25-28 March 2025). The title of the poster was "In vitro comet assay-based genotoxicity testing of 5G millimeter wave electromagnetic fields in primary skin cells", with M. Djuari, M. Engelke, J. Höfert, C. Ziemann, and A. Bitsch as authors. The authors concluded that 5G millimetre wave radiation at 27.5 GHz did not induce DNA-strand breaks or oxidative DNA damage in low-pigmented adult and juvenile epidermal keratinocytes and low-pigmented adult epidermal melanocytes after 4 and 24 h of exposure. The authors will further investigate changes in gene expression, epigenetic landscape, micro-RNA expression and telomere length. Many congratulations to Michelle Djuari for this achievement!

Check it out

SEAWave Extended; New Partners from Serbia and South Korea Join Project

On March 31st, 2025, the SEAWave project was granted an extension of six months. With the same grant amendment two more partners were associated with the project, namely the Faculty of Technical Sciences of the University of Novi Sad (FTN-UN) in Serbia, and the Electronics and Telecommunications Research Institute (ETRI) in South Korea. The two partners have already started contributing to the project with results in two respective publications:

- Song *et al* compared six deterministic and AI models for predicting electric field strength using the time series data obtained from urban continuous RF-EMF monitoring in the Serbian city of Novi Sad, namely at two kindergartens and an elementary school. The models were compared for prediction accuracy, performance degradation rate, and extreme value prediction accuracy. This preliminary study may be a valuable reference for large-scale deployment in real-time monitoring systems for public health protection. (doi: 10.1016/j.eswa.2025.126963)

- Lee *et al* measured the electric field strength within mobile communication bands in the largest city (Seoul), a small city, and a rural area in South Korea. The three measurement regions were selected based on population density. The authors reported the results of analyzing downlink RF-EMF levels in mobile communication networks currently in operation by frequency, time, and region. It was clear that the median of total downlink E-field strength for all cellular networks generations was 1.75 V/m, 0.75 V/m, and 0.61 V/m, in the three areas, respectively, namely it decreased with population density. (doi: 10.1109/APMC60911.2024.10867416)

NextGEM

New Research on 5G - No Cellular Impact Detected

A new study conducted within the NextGEM project, entitled *“Exposure to 26.5 GHz, 5G modulated and unmodulated signal, does not affect key cellular endpoints of human neuroblastoma cells”*, was published in *Scientific Reports* (Nature, July 1, 2025). The paper was authored by **Anna Sannino, Mariateresa Allocca, Maria Rosaria Scarfì, Stefania Romeo, Valentina Peluso, Gaetano Panariello, Fulvio Schettino, Gaetano Chirico, and Olga Zeni** from the Italian National Institute of Health (CNR) and the University of Cassino and Southern Lazio.
The study provides strong evidence that high-band 5G exposure at realistic levels does not disrupt cell cycle or DNA integrity, even under co-exposure with a DNA-damaging agent, reinforcing its safety under typical conditions. To achieve this, the team developed a reverberation chamber-based system enabling controlled exposure or sham-exposure, and confirmed through measurements of cell viability and cell cycle progression across eight positions that the environment itself had no effect on cellular health.

Discover more

NextGEM Wins International Awards

The NextGEM project received two international awards this summer for outstanding research on EMF and health.

At the **IEEE IEEE International Workshop on Electromagnetics Applications and Student Innovation Competition (IWEM 2025)** in Hong Kong (4–6 August), Ruben Otin, Eduardo Soudah (CIMNE), Gaetano Chirico, Fulvio Schettino, and Noa Betzalel were honoured with an *Honourable Mention* for their study on a computational human skin model to assess 5G electromagnetic field exposure. The study focuses on how 5G (FR1/FR2) energy interacts with human skin through multi-layer model simulations, evaluating electric field distribution and SAR.

Earlier, at the **BioElectromagnetics Conference 2025 (BioEM 2025)** in Rennes (22–27 June), Joshua Ziegler, Daniel Wollschläger (IMBEI), Dan Baaken (BFS), Maarten Velghe, Kelly Rijs (RIVM), Nikolaos Petroulakis, Alexandros Kornilakis (FORTH), Roya Dolatkhah, and Isabelle Deltour (IARC) received the prestigious **Alexandre Legros Award** for their umbrella review on RF-EMF exposure and cancer in humans. The study summarises findings from existing systematic reviews and meta-analyses and underscores the need for more rigorous, high-quality research to clarify the relationship.

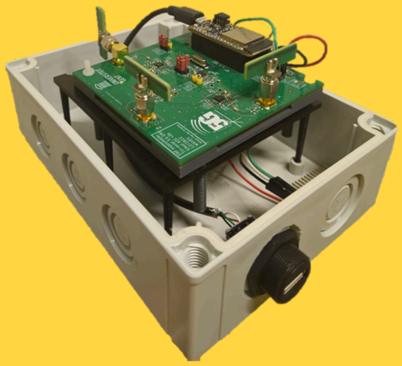
More info

GOLiAT

GOLIAT study finds higher mobile phone radiation during data upload in areas with fewer base stations

A study from the GOLiAT project suggests that the density of base stations is a predictor of personal exposure to radiofrequency electromagnetic fields (RF-EMF) when using a mobile phone: the more base stations there are, the lower the exposure from the users' own phone when sending data. The researchers also found that 5G requires less transmit power than 4G.

Learn more



New Low-Cost Sensor Developed to Monitor 5G Electromagnetic Field Exposure

Researchers from Ghent University working for the GOLiAT project have designed, calibrated and validated an affordable sensor to measure radio frequency electromagnetic field (RF-EMF) exposure induced by 5G networks. This new tool will help improve risk communication and support health and environmental research.

See Details

General news

NextGEM Innovation and Knowledge Hub (NIKH) Advancements

NextGEM continues to develop the Innovation and Knowledge Hub (NIKH) as a central platform designed to share scientific results, practical guidelines, and policy recommendations with relevant stakeholders, while also raising awareness among citizens. NIKH serves as a repository for global scientific literature and results from CLUE-H projects, with a primary focus on supporting policymakers and researchers. It compiles validated tools, integrated data, guidelines, and insights generated by NextGEM, with ongoing efforts to enhance literature reviews and risk assessments through real-world case studies.

Read more

Workshop on Societal and Ethical Impacts of 5G Held in Barcelona and Online

On May 26, 2025, the international workshop “Societal and Ethical Impacts of 5G Technology” was held in hybrid format at ISGlobal in Barcelona and online. Hosted by project GOLiAT under the EU-funded CLUE-H Cluster, the event gathered 102 participants from academia, industry, and the public sector to discuss ethical and societal issues related to 5G and RF-EMF technology. Topics included risk perception, public distrust, misinformation, ethical challenges in research and communication, and the importance of fairness, accountability, and transparency. Presentations were made by representatives of each of the CLUE-H projects

The discussions in the workshop emphasised the importance of integrating ethical reflections throughout the research process to ensure scientific integrity and build public trust through transparency and trans-disciplinary dialogue, and the need for inclusive and ethical communication strategies in RF-EMF research, addressing public concerns through participatory approaches, tailored messaging, and respectful engagement with diverse perspectives.

Detail report

BioEM 2025: Advancing Bioelectromagnetics in Rennes, 22–27 June 2025

BioEM 2025 took place in Rennes, France, from 22–27 June, bringing together the global bioelectromagnetics community at the Couvent des Jacobins. The conference featured sessions on 5G exposure, EMF dosimetry, and experimental research, with strong contributions from EU projects like NextGEM, GOLiAT, SEAWave, and ETAIN. Several awards highlighted the excellence of researchers across the CLUE-H cluster. Joshua Ziegler (NextGEM) and Lea Belackova (ETAIN) received Alexandre Legros Travel Awards for top student presentations. GOLiAT researchers Irina Wipf and Valentin Waibl were recognized for their work at external conferences, and Michelle Djuari (SEAWave) earned Best Poster at the 10th German PharmTox Summit. Seppe Segers (NextGEM) also received a Student Poster Award at BioEM 2024. Numerous other awards were also presented, underscoring the continued impact and quality of work across the cluster projects.

Explore

CLUE-H Holds 4th Annual Meeting at BioEM 2025 in Rennes

The 4th Annual Meeting of the European Cluster of EMF and Health took place on 25 June 2025 during BioEM 2025 in Rennes, France. Held at the Couvent des Jacobins, the event brought together key stakeholders to review progress, address challenges, and plan future directions in EMF and health research. The agenda featured updates from EU representatives cluster projects, including SEAWave, NextGEM, GOLiAT, and ETAIN, with dedicated sessions on communication, data management, experimental studies, exposure assessment, and policy development. Project coordinators and working group leaders presented updates, while remote access enabled broader participation. Visit the CLUE-H website to find the news item about the Annual Meeting.
Key Highlights:

- Multiple awards and prizes were won by cluster members.
- Training on electromagnetic fields and health with an epidemiological approach was delivered at the Erice School.
- 5G societal and ethical impact workshop attracted over 100 participants from academia, industry, and public sectors.
- Unified data management frameworks are being implemented across projects, with repositories established in Zenodo, Dataverse, and Yoda.
- Experimental studies are being harmonized to allow comparability across 5G exposure in humans, rodents, insects, and cell models.
- The second policy brief on 5G exposure of European citizens is in preparation, aimed at policymakers.

Take a closer look

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ETAIN NextGEM SEAWave GOLiAT

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