cea leti

2023

_HIGHLIGHTS

January-August

INSTITUT CARNOT CEA LETI

PARTNERSHIP

CEA and Renault Group develop a very high efficiency bidirectionnal on-board charger

What if the vehicle became a pillar of the electricity network? This is the principle of V2G, or vehicle-to-grid, a bidirectional exchange technology that will soon enable Renault vehicles to restore part of the electricity stored in the batteries to optimise the operation of the grid and compensate for the intermittent nature of renewable energies.

HEALTH

CEA's team and its startups present at CES 2023 for a new consecutive year!

CEA-Leti showcased two startups (Injectpower and Admir) and the NIR demonstration for medical application.

STARTUP

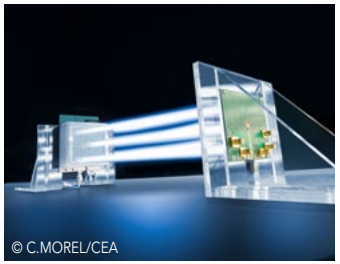
Discover the 2022 CEA-Leti's startups

2022 was a prolific year at CEA-Leti.
The institute supported the creation of five startups, two in healthcare and the rest in quantum computing, LIDAR and water quality.

TELECOMMUNICATIONS

Innovation to fuel 6G wireless communications

CEA-Leti are already designing solutions to meet the needs of 6G wireless technology. By combining existing manufacturing processes and an innovative architecture, CEA-Leti teams have successfully demonstrated a solution for D-Band (140 GHz) wireless communications.



› Leti Healthcare Workshop 2023: Future diagnostic imaging equipments

Renowned scientists, startup CEOs, CTOs from Medical Imaging industrial leaders and Innovative clinicians unveiled some innovations in biomedical imaging technology for diagnostic tests. Click to discover more!

› Inject Power: 2023 CES Innovations Award Honoree

Congratulations to the Injectpower team! We're pleased to announce that the ultra miniaturized battery for medical devices is a CES Innovations Award 2023 Honoree, in the Digital Health category.

› New X-ray detectors for medical radiography

How can medical radiography become more efficient for everyone? Discover it in video!

› How to better detect and measure gas in our environment?

CEA-Leti's teams are developping a miniaturized multi-gas traces detection system without concession on performance.
Watch the video!


© L.GODART/CEA

HEALTH

Allergy: a device developped by CEA-Leti automates testing and turns results around in just an hour

Testing for contaminants like gluten in food products no longer needs to be done at a lab. CEA-Leti's fully-automated, fast, and versatile lab-on-a-chip can detect and count proteins, making it ideal for a variety of industrial use cases.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OPTICS

Did you know that CEA-Leti has R&D facilities in photonics?

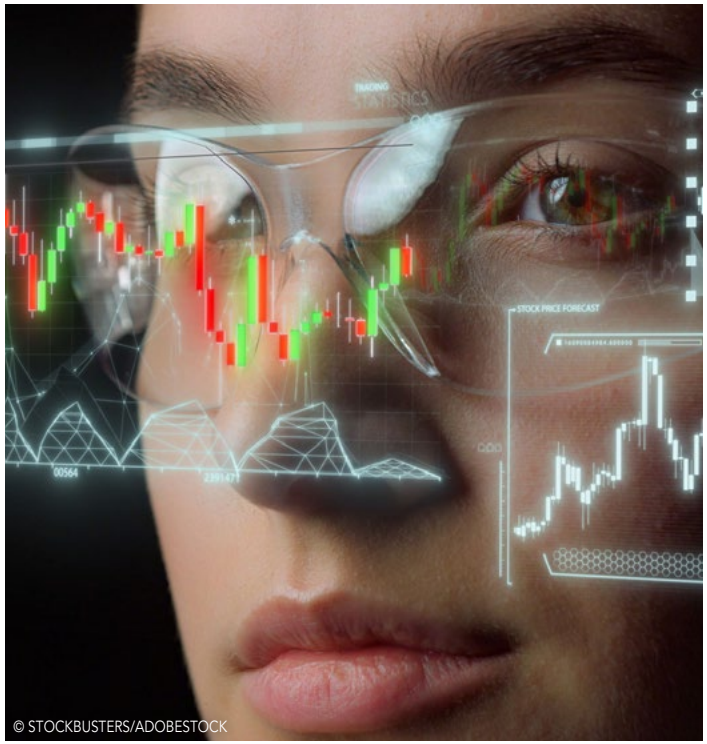
CEA-Leti's Photonics Platform is staffed by 300 scientists and engineers and generates some 700 patents per year. Learn more about how a photonics R&D partnership with CEA-Leti can help you address tomorrow's technological challenges.


© CEA

SCIENTIFIC EXCELLENCE

FDN: Ludwig Rotsen receives the best paper award for his work on DNA nanotech

Thanks to the new process for depositing DNA nanostructures on silicon dioxide, Ludwig controls every 2D network interaction, and his work will enable great strides in the field of quantum computers.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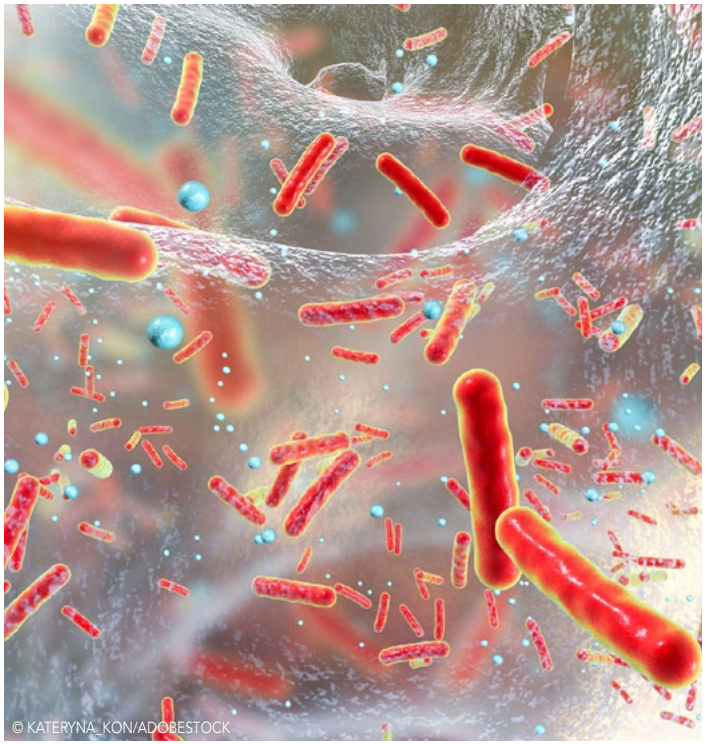
AUGMENTED REALITY

CEA-Leti's recent advances on key AR building blocks, e.g. retinal projection and holography

With the global market for AR glasses expected to reach more than $74 billion by 2032, CEA-Leti scientists are investigating a variety of technologies to enable wide use of these devices for medical, education and military applications.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HEALTH

Choosing the right antibiotic in only two hours

Currently, labs require at least eight hours to determine the most efficient antibiotic treatment for a given infection. SUPPLY, a new research project at CEA-Leti, hopes to revolutionize this process thanks to a novel method of analysis based on “optical tweezers”.

SPORT

Skiing more efficiently thanks to a battery-free, connected device

Established by a consortium of stakeholders from the Région Auvergne-Rhône-Alpes, the Smart Ski Experience project explores a new connected ski technology that will offer snow sports enthusiasts an unprecedented ski experience.


© DELL/ADOBESTOCK

EDGE IA

CEA-Leti researchers published in Nature Electronics

Joint efforts between CNRS, HawAI.tech and CEA-Leti, lead to energy-efficient computation architecture. Implementing memristors into bayesian machine,could provide explainable decisions while functionning on local memory with minimal data movement.

SPACE

II-VI Workshop: Ségolène Dinand receives the Best Student Paper Award

Space is not a very hospitable environment... especially for image sensors on orbiting satellites. Ségolène Dinand devoted her PhD to better understanding how the radiation environment in space affects HgCdTe infrared detectors.


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› Leti Photonics Workshop 2023: Breakthrough photonics

Discover cutting-edge results for the future of photonics-based applications. Download the slides here!

› An autonomous vehicle that monitors you state

Driver monitoring systems (DMS) are increasingly gaining importance with the growth of autonomous cars. The research carried out by CEA-Leti is focused on the behavioural and physiological characterization of the driver in order to provide a global ‘fit-to-drive’ index reflecting the state of the driver. Discover it in video!

› A new turn in 3D imaging

CEA-Leti researchers have developed a 3D microscope that is compact, robust, and easy-to-use.
Watch the video!

› Discover CEA's new podcast series

With "The Cherry in the Lab", discover the careers of 13 CEA women scientists with rich and varied backgrounds.
Check out the podcast!

MICROELECTRONICS

Did you know that CEA-Leti has cleanrooms dedicated to R&D projects with and for our partners?

CEA-Leti Cleanroom Platform is home to world-class semiconductor manufacturing equipment and processes. As a CEA-Leti R&D partner, you can access these resources to develop robust and competitive solutions.

ARTIFICIAL INTELLIGENCE

A transistor inspired by human synapses

This transistor boasts many similarities with human synapses: how it operates, its ultra-low energy consumption and a similar level of miniaturization. It opens the door to a future with more powerful circuits that will meet AI's needs.

MICROELECTRONICS

E\PCOS: Anthony Albanese receives the Best Poster Presentation Award

Anthony Albanese's research on amorphous chalcogenide materials for highly nonlinear on-chip components confirm CEA-Leti's expertise at the forefront of More than Moore solutions.

SPACE

International Space Station: the hunt for bacteria

How can we prevent bacteria from settling and proliferating on the inside surfaces of the ISS? Since 2016, CEA-Leti has been collaborating with ENS Lyon to solve this challenge. In particular, the project aims to develop smart, bio-inspired coatings without toxic metals or nanoparticles.


© KIRICHAIE/ADOBESTOCK

AUGMENTED REALITY

Retinal Projection, an innovative, integrated solution based on holographic pixels

CEA-Leti researchers are exploring how to create transparent, smart glasses that look like normal ophthalmic lenses, but could transmit information directly onto a user's retina.

PARTNERSHIP

Discover Terradona and CEA-Leti's solution for waste reduction

Every time you drop glass into a connected sorting container, you earn points! Based on a unique combination of low-cost MEMS, Cliiink identify glass and other items and calculate both the size and amount of waste deposited, while ensuring minimal energy consuption.


© CLIINK

MICROELECTRONICS

Discover Nanocharacterization platform

When you need a deep understanding of innovative composites and other materials, our Nanocharacterization Platform, with its more than 100 scientists and engineers and more than 50 advanced machines and instruments, can help.


© P.JAYET/CEA

CYBERSECURITY

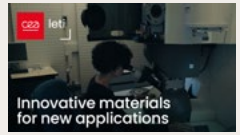
Enhanced security for processors cache memories

CEA-Leti's solution ScrambleCache, is a hardware countermeasure that improves the two most commonly used security mechanisms: randomization and cache partitioning.


© LELOUCH/ADOBESTOCK

› Innovative materials for new applications

For several years now, the field of microelectronics has studied phase change materials, most of which are chalcogenides. At CEA-Leti, we have added a fourth element to germanium, antimony, and tellurium. Can you guess which one? Watch the video!



› Customized GaN power components

Need a solution that converts solar energy into a 230 volts-50 Hz home network electric plug? Silicon makes this possible, yet it using gallium nitride is more efficient.
Watch the video!

› Is your job all about finding the Next Big Thing?

Hope you had a chance to join us in California for the Semiconductor Deep Tech Day at Plug and Play Tech Center. Click to discover more!

CYBERSECURITY

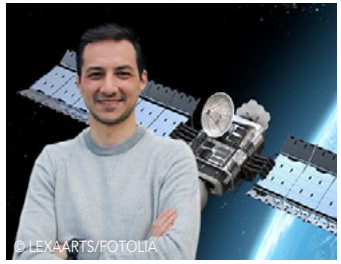
Did you know that CEA-Leti has its own Cybersecurity R&D facilities?

CEA-Leti's Cybersecurity Platform is home to more than 100 specialists dedicated to identifying the latest software and hardware vulnerabilities and developing robust countermeasures.

SCIENTIFIC EXCELLENCE

CEA in the top 5 for semiconductor patents

For the 11th year in a row, CEA ranks in the Top 100 Global Innovators by Clarivate. This international ranking once again highlights the relevance and success of CEA's strategy for intellectual property.



SPACE

ISAP: Marwan Jadid receives the Best Student Paper

Marwan Jadid delivered encouraging results in a crystal-clear presentation, showing how these advancements are expanding possibilities for applications and services that were once thought impossible.

PARTNERSHIP

CEA-Leti and Lynred achieve exceptionally sharp images using cooled infrared detectors

These new detectors can operate at 130 kelvin or more using a novel 7.5 µm pixel architecture with high resolution and exceptionally sharp images.

REPORT

Download CEA-Leti's Scientific Report 2022 to learn on the latest R&D available!

Whether you are a technology enthusiast, a business leader, or a researcher, the CEA-Leti 2022 scientific report is an essential resource for staying up-to-date on our latest developments in the field.

MICROELECTRONICS

PowerMEMS: Gaël Pillonet receives the Best Poster Award

Gael Pillonnet, a seasoned energy conversion expert at CEA-Leti, has come up with an ingenious solution that significantly reduces the energy consumption of traditional transistors, albeit at a slower computation speed.

HEALTH

Empowering tomorrow's leaders in health

CEA-Leti's Micro and Nanotechnology for Health platform offers cutting-edge R&D services focused on the medicine of the future.

AUTOMOTIVE

CEA-Leti to report new integration & packaging gains for next-generation LiDAR

CEA-Leti will detail its progress in integrating advanced technologies and components for HPC/edge-AI chiplets, optical computing, displays and imagers at ECTC 2023.

› **How to keep a purified air between two cleanrooms which are 250 meters apart?**

Tom Scott visited us to discover a complex and unique piece of equipment: our clean room shuttle. Discover his video!

› **Eclypia, the new startup working on a low-cost, non-invasive blood glucose sensor**
By pooling their know-how, Eclypia and CEA-Leti have developed an optimized, low-cost quantum cascade laser (QCL) manufacturing process that uses silicon as the key material production process that uses silicon as a production vehicle, bringing QCLs into the field of silicon photonics.


© CEA

HEALTH

Active micro-needles measure biological parameters and deliver therapies

Less invasive than traditional needles, micro-needles reach the deep layers of the epidermis to deliver drugs, measure physiological characteristics, or emit light at specific wavelengths.


© CEA

FOSTERING

Science Olympics

Microelectronics in our daily lives: CEA-Leti research engineers invested in high school students.
The objective is to discover engineering sciences and stimulate vocations among the youth people.


© DANIEL CHETRONI/ADOBESTOCK

HEALTH

A quicker and cheaper means to detect bloodstream infections

CEA-Leti is developing an innovative blood analysis technology that does not require a mass spectrometer, reagents or a qualified technician.


© GILLES WEBER/CHUV

HEALTH

Brain Computer Interface enables thought-controlled walking after spinal cord injury

Neuroscientists and neurosurgeons from EPFL/CHUV/UNIL and CEA/CHUGA/UGA/FDD Clinatec report in the journal Nature that they have re-established the communication between the brain and spinal cord with a wireless digital bridge, allowing a paralyzed person to walk again naturally.

PARTNERSHIP

Extending Moore's Law: CEA-Leti & Intel to prepare future transistor scalling

CEA-Leti and Intel announced a joint research project to develop layer transfer technology of two-dimensional transition-metal dichalcogenides (2D TMDs) on 300 mm wafers with the goal to extend Moore's Law beyond 2030.

HEALTH

ICASSP'23: Congratulations to Salam Hamieh for her price "honorable mention"

While it is true that AI is changing the way we work, Salam Hamieh believes that the issue is not about machines replacing humans, but rather about humans and machines working together to achieve better results.

MICROELECTRONICS

Edge AI, in-memory computing and neuromorphic computing for tomorrow's IoT devices

Advances in microelectronics at CEA-Leti are enabling new computing paradigms for secure, low-latency, low-power IoT solutions.

PARTNERSHIP

Vitesco and CEA-Leti concentrated competence in battery management

Together they have developed a "switched battery" (SWIBA) management technology that further improves the overall performance of the powertrain of electric vehicles by increasing their range and reducing their fast charge time, while optimizing the cost of charging, and increasing the life of the battery.

› Wafer-to-wafer process

Discover CEA-Leti expertise in terms of hybrid bonding. Watch the video!

› **PhD Generation: Stay tuned for season 4 !**

Season 3 offered up 11 dedicated episodes available online where brilliant minds delve into the intricacies of addressing modern challenges while sharing captivating anecdotes at CEA-Leti. So, while you're waiting for the next season, discover or re-discover every episode of PhD Generation S3. Watch the video!

MICROELECTRONICS

CEA-Leti proof of concept demonstrates electrons move faster in Germanium Tin than in Silicon or Germanium

CEA-Leti scientists demonstrated that electrons and other charge carriers can move faster in germanium tin than in silicon or germanium, enabling lower operation voltages and smaller footprints in vertical than in planar devices.

TELECOMMUNICATIONS

What can CEA-Leti's telecommunications R&D services do for your business?

Discover the offer of the telecommunications platform where more than 100 researchers responsible for more than 300 patents, propose state-of-the-art solutions for any type of telecommunication systems.

INDUSTRY 4.0

An innovative, connected cylindrical bushing for predictive maintenance in construction vehicles

PEL® 4.0 is an innovative sliding bushing solution that includes multilevel wear sensors, RFID tag and antenna. The RFID tag enables users to track wear and facilitates predictive maintenance. This innovation is designed to withstand the harsh conditions of construction sites.

EVENT

Leti Innovation Days 2023: Transformational technologies for your products and our future

CEA-Leti's annual flagship event unites industry leaders to delve into the semiconductor industry's pivotal role in driving technological advances that transform society, with representatives from the entire microelectronics value chain in attendance. Watch the video.

MICROELECTRONICS

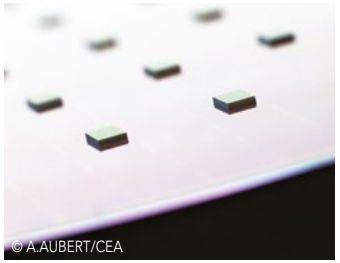
NextGen: CEA is inventing the future generations of electronic chips to maintain France's competitiveness

By launching the NextGen project, the CEA-Leti aims to develop new generations of FD-SOI chips with better energy efficiency. It will ensure the capacity to engineer the most advanced components and maintain French and European microelectronics competitive for the future markets.

MICROELECTRONICS

Advanced Packaging: performance, power, size, weight, cost... The choice is yours!

CEA offers a complete chiplet and 3D integration toolkit enabling a modular "one to many" approach that speeds up the development of new solutions for automotive, high-performance computing, data centers, imaging, and more.



MICROELECTRONICS

Innovate tomorrow's devices today with CEA-Leti's 200 mm & 300 mm Microsystems platform

Home to state-of-the-art 200 mm and 300 mm process equipment and expertise, the 200 mm & 300 mm Microsystems platform develops sensors, actuators, RF microsystems (MEMS-RF), and integrated packaging solutions.

MICROELECTRONICS

Electrochemical society conference: JM. Hartman receives the Electronics ans Photonics Division Award

By launching the NextGen project, the CEA-Leti aims to develop new generations of FD-SOI chips with better energy efficiency. It will ensure the capacity to engineer the most advanced components and maintain French and European microelectronics competitive for the future markets.

› **Leti Semicon Workshop 2023: Paving the way for low-power, high efficiency computing & sensing**

CEA-Leti is driving deep, sustainable innovation for low-power devices and sensing technology that meet the needs of More than Moore applications.
Click to discover more!

› Quobly raises €19 million

Quobly (formerly Siquance) has successfully raised €19 million. The highest amount ever raised by an CEA-Leti start-up for a first funding round. This funding will accelerate the development of a fault-tolerant quantum processor for universal quantum computing.

› Microoled raises €21 million

The start-up from CEA-Leti is specialized in the design, production and marketing of OLED microdisplays for near-eye applications. In just a few years, Microoled has become a key partner of the world's top technology integrators with a unique technology that combines high resolution, high levels of brightness and low energy consumption.


© P.JAYET/CEA

POWER ELECTRONICS

Achieve optimal performance with CEA-Leti's power electronics platform

The power electronics platform is developing innovative substrates, components, and architectures devoted to power conversion, from the design stage to a functional demonstrator. With pre-industrial equipment, it offers customized support to industrial partners.


© C.MOREL/CEA

TELECOMMUNICATIONS

Radiofrequency & silicon photonics for high-performance, low-power secure data transmission

CEA-Leti's datacom solutions are built on some of the most advanced radiofrequency (RF) and silicon photonic (SiPho) technologies available anywhere, for high-performance, low-power, secure data transfer over the air or using light.


© CEA

MICROELECTRONICS

ECTC: Congratulations to Aurelia Pilhon for her outstanding Interactive Presentation Paper

Aurelia and her team achieved encouraging results and reached TMIs with an unprecedented height-to-pitch ratio, with a 225 µm height, a 50 µm diameter, and a pitch of only 100 µm.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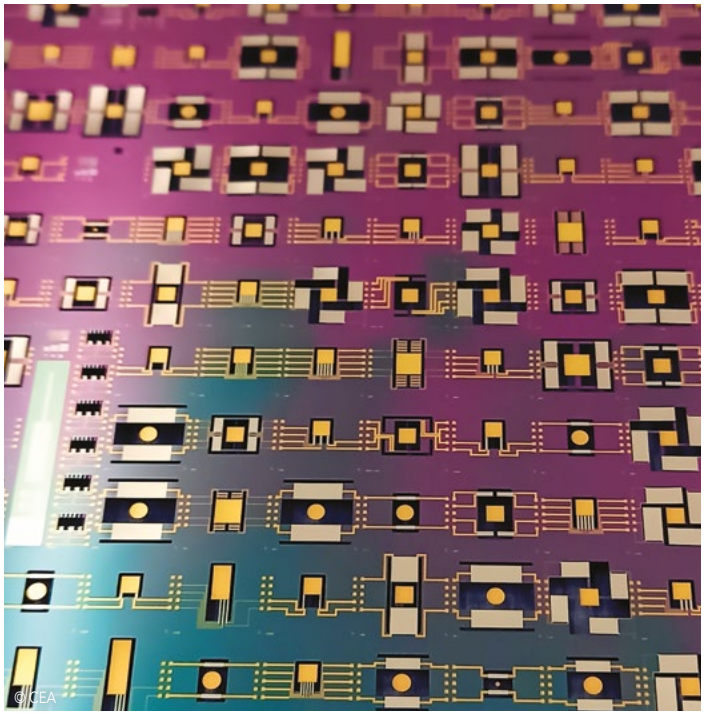
HEALTH

Enabling technologies for health at all stages of life

Human and animal health and the environment are inextricably linked. CEA-Leti is developing enabling technologies to support an integrated approach that spans #diagnostics, therapeutics, prevention, and monitoring.



MICROELECTRONICS

MEMS & NEMS, enabling technologies for small, lightweight, cost-effective devices

MEMS and NEMS micro and nanoelectromechanical systems, are tiny devices like sensors, actuators, and micromirror arrays, with moving parts that are sensitive to a physical quantity like speed, pressure, or direction. They convert this physical quantity into an electrical signal, which can, in some cases, operate an integrated micro-actuator.

SIGNAL TRANSMISSION

Using ultrasound to supply sensors and transmit data through metal walls

Wallpass uses sound waves to power and probe all types of sensors (temperature, stress, strain, vibration, etc.) located in enclosed metal environments, such as pressure vessels. It can transmit signals with a strength of few watts through several centimeters thickness walls.

SYSTEMS

Cyberphysical systems are where the digital & physical worlds meet

CEA-Leti's Cyberphysical Systems platform is developing innovative interfaces between the physical and digital worlds for a wide range of use cases.

Stay up to date

Follow us on social media @CEA-Leti

cea-leti.com

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UNION EUROPÉENNE

FRANCE 2030

La Région Auvergne-Rhône-Alpes