

Event

MINATEC gets €150 million worth of new buildings

With €150 million of building construction projects planned or underway, MINATEC is undergoing a major expansion—its biggest leap forward since it was established in 2002.

The Nanobio2 building (1,400 m² of useable space) will be inaugurated in just a few weeks. Construction has begun on the Phelma II building (8,500 m² of gross floor area) and on a new skills center (10,000 m² of gross floor area) that will be home to Leti and CNRS researchers starting in 2015. Plans to expand the B2I and BHT 2 buildings and the outdoor showroom have been approved and construction should begin soon.

Coming soon: Shops and services

This spate of construction projects reflects MINATEC's undeniable success. The BHT building is bursting at the seams and cannot cope with new requests from companies seeking to set up shop there. Several R&D programs, especially in photonics, are ramping up and need more space. Staff working in portable buildings dream of one day having permanent facilities.

The construction work is being financed by local government agencies, private sector organizations, and the CEA; the French national government plays just a minor role in financing the new projects. Employees working at MINATEC will see a major difference once the innovation center is complete: 2,000 m² of shops and services will be located where the on/off ramp used to be.

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Innovation

Tracking down deposits on artery walls

Can nanovectors be used to diagnose and treat atheromas—the fatty deposits on artery walls that can eventually lead to a heart attack or stroke? This question is at the heart of the EU's NanoAthero project, which was launched in March 2013 and is being coordinated by INSERM. Scientists will test five types of nanovectors including Leti's Lipidots® (biodegradable oil nanodroplets), already used in imaging and cosmetics.

Diagnosing atheromas is currently more art than science; doctors tend to put patients on cholesterol medication just to be safe.

NanoAthero is a €10-million, five-year project that will include clinical trials on 30 patients. It gives Leti an opportunity to ramp up production of its Lipidots®, while respecting pharmaceutical industry best practices.

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Nanowires for supercapacitors

Two INAC labs have chalked up a major breakthrough that will make it easier for chip manufacturers to use supercapacitors in their computer chips. Researchers at these labs used a vapor chemical deposition process to create nanostructured silicon electrodes, and then made these electrodes both capacitive and stable through a special surface preparation.

These electrodes deliver (almost) ideal performance: they can withstand several thousand charge-discharge cycles with very little energy loss and no physical deterioration. Researchers were able to achieve voltages of 3 V–4 V using ionic liquids or ionogels as the electrolyte.

The capacity of these supercapacitors still needs to be increased to rival their large-scale counterparts, like the ones used in defibrillators. And two R&D projects—one sponsored by the EU and one by the French National Research Agency (ANR)—are underway to do exactly that.

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Actin, nature's architect for 3D connections

Actin, a protein in plant and animal cells, has the special property of being able to form microfilaments on its own. And according to researchers at Leti and IRTSV, this makes it an ideal "material architect" for 3D connections. They made 10- μ -diameter connections from self-grown actin filaments covered in gold. These filaments can now undergo electrical testing.

Thanks to actin's filament-forming ability, researchers can use it to build connections in all directions and not just horizontally or vertically. This research—a world first—was published in *Nature Materials*.

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Innovation

MEIS looks at nanowire constraints

MEIS, or medium-energy ion scattering, offers very-high-resolution chemical and structural surface analysis capabilities. The technique works by analyzing the energy and angle of backscattered ions, and is frequently used for flat layers. A team of researchers from INAC and Leti recently came up with an innovation when they used MEIS to study the optical properties of gallium nitride nanowires.

The nanowires' optical properties depend on the constraints of the nitrides in the wires. MEIS can assess the constraints to within 0.1% by measuring the deformation of the atomic structure by depth.

Software modifications made this new use of MEIS possible. It could potentially be used for deformation measurements on other nanowires—like germanium-silicon or indium gallium arsenide, for instance.

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Microcoolers hold it together under pressure of 250 bars

Leti engineers had a surprise in store for CERN researchers when they recently presented microcoolers they had made for a CERN experiment. While the technical specifications for the microcoolers required pressure resistance of up to 100 bars, Leti's devices held strong even at 250 bars! And the CERN is looking for even more powerful pumps to test the microcoolers' limits.

The microcoolers, delivered to the CERN in late 2012, were made by combining two silicon plates using molecular bonding. Testing of these devices usually looks at pulling strength rather than pressure resistance, so Leti discovered a hidden benefit to its pioneering design. Other applications are being considered, and patents are likely over the horizon.

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Even faster multi-core processor calculations

Grenoble-based engineers from CEA-List have more than doubled the speed of a matrix multiplication program using a new dynamic compilation method. This method, designed specifically for multi-core processors, works by optimizing the execution of the most calculation-intensive sections of code. It offers an attractive alternative to static compilation, which optimizes the overall code using conservative options.

Today the engineers perform the dynamic compilation manually based on an expert analysis. But they believe that it can be fully automated within the next five years. Applications for their method include multi-core embedded systems and high-performance calculators—unleashing the full potential of such devices.

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Day by day

BeSpoon sets a world record at 3,641 meters

Locating an object to within just a few centimeters sounds easy—except when you are over 3.6 km away. But that's what French start-up BeSpoon was able to do using impulse radio ultra-wideband (IR-UWB) technology developed by Leti. This range of 3,641 meters sets a world record based on emergency situation UWB regulations; the range based on standard UWB regulations is 880 meters.

With this breakthrough BeSpoon and Leti have overcome two disadvantages to conventional IR-UWB: its limited operating range and the difficulty integrating it on a single chip. Their system, which includes a CMOS transceiver, can be incorporated directly into a smartphone or set-top box, for example.

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Lens-free virus viewing thanks to a webcam

It may soon be possible to view cells, bacteria, and viruses without a lens by using a simple webcam CMOS image sensor and LED lights. While this may sound like something concocted by a mad scientist, it is in fact a practical idea that Leti and UCLA researchers have been working on for the past four years. The results of their research—which gave rise to several patents—were published in *Nature Photonics*.

The images generated by this system, once processed, make it extremely easy to identify and count the number of cells on a 25-mm² surface. To identify bacteria and viruses, some 10 to 100 times smaller, scientists simply need to add a biocompatible liquid wetting agent that serves as an indicator. The researchers have formed partnerships with businesses and universities to further develop their method.

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CERN chips employ Leti's TSV technology

Leti's Open3D® integration platform has another prestigious contract under its belt. The platform was used to develop through-silicon vias (TSVs) for chips designed by the CERN and manufactured by IBM. The TSVs make it easier to assemble the ASIC chips used in pixel array detectors for high-energy particles, since they eliminate the need for filament connections—which typically cover 6%–10% of a detector's surface.

Leti's Open3D® platform develops technology bricks for outside customers for preseries runs. The first chips for the CERN are currently in the testing phase.

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Day by day

Leti Innovation Days brings together businesses and researchers

Leti's annual gathering will be held at MINATEC on June 25–28—with one big novelty: this will be the first year of the new format, beefed up considerably relative to the Leti Annual Review. This first edition of the Leti Innovation Days will include a full program of talks and workshops on technical topics. The central theme will be the impetus that innovation and technology transfer can give to all kinds of businesses.

The first day will consist of plenary sessions, including one on start-ups that will showcase Leti's experience with spinning off new businesses. Speakers will include industry professionals like Marc Pircher, President of the Toulouse Space Center. The second day will consist of four parallel talks on technology-related issues. On the third day participants will be able to choose from workshops on memory, photonics and imaging, nanopackaging, and 3D design.

Visit www.leti-innovationdays.com for the full program and registration.
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Philippe Mallein, Knight of the French National Order of Merit

In a ceremony at MINATEC on March 26, 2013, Jean Therme, head of France's Atomic and Alternative Energy Commission (CEA), awarded the Knight of the French National Order of Merit medal to Philippe Mallein, an innovation and user-driven design consultant for CEA-DRT and for MINATEC's IDEAs Lab, which he helped establish.

Mallein sees himself as an anthropologist for user-driven innovation. For the past 40 years he has been studying innovation from a user perspective, looking at the changes that a new technology can bring to users' day-to-day lives: their habits, know-how, identity, and surroundings.

Mallein used his hallmark multidisciplinary approach to develop a user-driven innovation method called CAUTIC®, for which he won the CNRS Cristal Award in 1999.

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Phelma introduces a work-study program for micro and nanoelectronics

This fall Grenoble Institute of Technology-Phelma will kick-off France's first work-study program for micro and nanoelectronic systems design. This program was developed in association with Grenoble-area high-tech businesses and was approved by the regional government in April 2013. The program will give engineers the theoretical knowledge and real-world experience to design integrated systems. It aims to fill the void of such skills, particularly acute in RF and analog systems.

The school has almost completed the admissions process for the first class of some 16 students, who will split their time between on-site work and classroom study. The companies participating in the program range from small businesses to large organizations like E2V, STMicroelectronics, and the CEA.

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Grenoble Institute of Technology neck-and-neck with Polytechnique

Grenoble Institute of Technology came in second place in the latest ranking of France's 100 top engineering schools, just behind rival Polytechnique. In terms of R&D, Grenoble Institute of Technology jumped from seventh place in 2012 to first place this year. The ranking is put together every year by *L'Usine Nouvelle* magazine. In 2013 the magazine highlighted Grenoble Institute of Technology's significant role in spawning start-ups and its partnership with local angel investor group Grenoble Angels.

In another ranking, by *Industrie & Technologies* magazine, Grenoble Institute of Technology led the pack for its R&D—outstripping rival Polytechnique. The ranking's three assessment criteria are revenue generated by R&D contracts, the number of patents filed since 2008, and the number of PhD and post-doc students.

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Aledia powers ahead at light(n)ing speed

Aledia, a start-up spun off from Leti, has just crossed two important milestones. First, it has finished making its first series of LEDs on 200 mm silicon wafers—a breakthrough process that cuts LED production costs by a factor of four relative to conventional methods. And second, the young firm has raised €10 million of fresh capital from four investors, including CEA Investissement.

Aledia's technology leverages six years of R&D at Leti and INAC and two years of its own in-house R&D. It involves growing gallium nitride (GaN) microwires directly on large-diameter silicon wafers, and can triple or even quintuple the light-emitting surface of LEDs. The company initially plans to target applications in backlighting, televisions, and lighting. The next milestone will be the market launch of its LEDs, scheduled for early 2015.

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Productive fun in store at the 2013 Phelminaire

The 2013 Phelminaire, a day-long seminar for Grenoble Institute of Technology-Phelma faculty and staff, will be held at the school's campus on July 1, 2013. Some 100 people are expected to attend. The morning program will include a series of small-group workshops on teaching-related issues, using fun activities like role-playing games and panel discussions to get everyone involved. The goal will be to encourage all employees to take part in improving teaching at the school.

Before lunch the participants will come together to summarize what they discussed in the workshops. This year's lunch will be prepared by a non-profit organization that helps disabled people enter the workforce. The afternoon program includes an entertaining game with tantalizing prizes on offer.

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Leti sets the stage for 14 nm FDSOI

The first 14 nm microelectronic circuits won't be produced on a large scale until 2015 or 2016—but now is when engineers need to decide which technologies they want to use. That's why Leti has just put together a 14 nm design kit for one of its flagship technologies: fully-depleted silicon on insulator (FDSOI).

The kit lets engineers compare two different integration methods for a given circuit: 2D, which is the current standard; and monolithic 3D, which many microelectronics industry players see as the next step forward. The kit also helps designers identify and evaluate future fabrication steps. And everything is done virtually, without the need for a physical demonstrator.

The kit has been provided to engineers at Leti and STMicroelectronics (Leti's FDSOI research partner), and could ultimately be made available to other businesses as well.

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Interview

Fabien Ndagijimana
IMEP-LAHC,
Pheline lab*

We want to calm the debate on electromagnetic waves

In the book you wrote with Pheline colleague François Gaudaire [called Au Cœur des Ondes]—were you out to attack electromagnetic waves or defend them?

Neither. What we wanted to do is calm the debate on electromagnetic waves, which is being fuelled by the media and by outlandish stories circulating on the internet, like people being able to cook eggs or make popcorn near a wireless device. None of this has been corroborated with laboratory experiments.

The aim of our book is to describe, explain, and demystify the technical aspects so that each reader can form his or her own opinion. As researchers we can't just sit on the sidelines of the debate.

Do you feel it is a researcher's role to write this type of book?

I couldn't find anything on this issue written for non-specialists who simply want to learn more. And informing the public is part of Pheline's mission; for example, this year we are visiting several Rhône-Alpes area high schools to give presentations and meet with students. I tell students that there is no scientific evidence to date proving that cell phones are harmful. But I also tell them not to sleep with their cell phone under their pillow, since we don't have a firm idea of the risks.

What kind of research does Pheline do?

We look at issues related to buildings, like lighting, home appliances and electronics, and wallpaper and other materials that can block electromagnetic waves. We also study human exposure; we plan to take measurements in five media libraries in Lyon to see if they correspond with complaints made by library employees and visitors. We also do metrology and dosimetry.

*Pheline lab is a UJF-CSTB joint lab for electromagnetic research.

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Horizons

Body Area Networks gain traction

You've probably heard of people being equipped with sensors, like athletes who want to study their body movements or the elderly who receive remote care. But figuring out how the electromagnetic waves propagate isn't easy, since the human body itself is an obstacle that can interfere with waves' behavior. This is a major challenge in the field of Body Area Networks—and won Ramona Rosini, a PhD student at the University of Bologna performing research at Leti—the Best Student Paper award for her dissertation on this subject.

Rosini showed that different propagation models should be used depending on whether the field emitted by the antenna runs perpendicular or tangential to the body. The waves propagate either around the body or by reflecting off of nearby objects. Rosini's work shows that new models substantially different from those used for waves in unobstructed areas need to be developed.

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Leti teams up with Rohde & Schwarz on RF

Rohde & Schwarz, a German manufacturer of radiofrequency (RF) test equipment, has teamed up with Leti to develop technology to improve its systems. The goal is to find a way to characterize the RF blocks (like amplifiers, oscillators, and frequency mixers) used in tablets and smartphones under real-world conditions.

Existing characterization tools take into account only a "standard" configuration, but the chips into which these RF blocks will be integrated could have two inputs, two outputs, or an unusual impedance characteristic. This is a major stumbling block for R&D in this field.

Leti's partnership with Rohde & Schwarz will start with PhD research. The firm hopes to eventually be able to offer new options with its equipment, while Leti plans to grant licenses for using its algorithms and characterization method.

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iGEM team opts for an optogenetics project

For the third year in a row, Grenoble Institute of Technology-Phelma students will take part in iGEM, the global synthetic biology competition held by MIT. The Grenoble team will consist of ten university students: four from Phelma; three from UJF; two from Mines de Saint-Étienne; and one student from the US (Louisiana) doing an internship at LMGP.

The team's project involves optogenetics, or the genetic modification of cells so they react to light. They will develop a system that lets them precisely control two key bacteria culture properties—cell density and cytosolic protein concentration—using light signals. Project work started in late May and the European qualifications will be held in Lyon in October, a month before the finals in Boston.

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N+1 theater company camps out at the CEA

The N+1 theater company, currently in residency at Atelier Arts-Sciences, will set up its third and last camp on June 10–14, 2013, in a yurt in front of CEA building 20.33. While there the thespians will investigate how researchers get their ideas. The theater company will work with a core team of scientists and engineers from the CEA, GIPSA-Lab, and Grenoble Institute of Neurosciences—as well as anyone else who wants to participate—under a highly structured program.

If you are interested, visit the yurt during your lunch break (between noon and 2 p.m.) to go through a 20-minute session called *Comment Ça Marche dans la Tête* ("How Your Mind Works"). This artistic research carried out through immersion in a scientific environment will be used to create a work that will be performed at Rencontres-i in October 2013.

Learn more at (in French): www.atelier-arts-sciences.eu.
Contact: arts-sciences@theatre-hexagone.eu

Horizons

Leti traces its SOI history in a new book

In a new book called *Des Hommes et des Ions* ("Of Ions and Men"), French journalist Isabelle Doucet tells the story of how Leti researchers—including Michel Bruel, Alain Soubie, and Jean-François Michaud—studied and revolutionized microelectronics R&D with their work on silicon-on-insulator (SOI) technology.

The book is subtitled *Chroniques d'une Aventure Humaine* ("Chronicles of a Human Adventure"). It traces how an intuition was transformed into a R&D project, and, ultimately, a business plan with the Smart Cut™ technology patented by Michel Bruel in 1991. Recently published and distributed by CEA-Leti, the book contains 76 pages of testimonials and photos spanning the three decades of blood, sweat, and labcoats that led to the founding of highly-successful Soitec just before the turn of this century.

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Crocus Technology commits for five years

Crocus Technology's R&D partnership with Spintec is changing tempo. After years of working through renewable one-year agreements, the duo have committed to a five-year agreement (2013–2017) to form a joint lab guaranteed to employ a set number of people.

This move comes just ahead of Crocus Technology's launch of industrial scale production. Its R&D with Spintec was initially oriented towards long-term goals, but is now focusing on tangible applications combined with product development.

The two parties also took advantage of the new agreement to update terms and conditions on intellectual property and the use of research results.

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An interactive stage glove for a one-man orchestra

Ezra, a beatboxer (a performing artist who produces vocal percussion sounds), is working with Organic Orchestra 2.0 to develop an interactive stage glove as part of his residency at Atelier Arts-Sciences. The glove contains numerous microsensors and miniature batteries that let the artist control an entire sound and lighting system using natural hand movements.

This project is being carried out through a multidisciplinary collaboration among CEA (Liten and Leti) researchers, design students at France's National Academy of Industrial Design (ENSCI), and Jean Strazzeri, Grenoble's only surviving traditional glove maker. You can watch Ezra perform with his new glove at Rencontres-i on October 4–5, 2013.

Note: A crowdfunding campaign has been launched on www.kisskissbankbank.com.
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IRT Nanoelec celebrates its first year

The 17 Grenoble-based members of IRT Nanoelec will meet at MINATEC on June 24, 2013 to celebrate the research institute's first anniversary. All seven of the planned R&D projects have been kicked off since the institute was created in April 2012, including projects on 3D integration and photonics on silicon—the system's core technology. The project launches are accompanied by technology transfer initiatives, primarily targeting SMEs.

The institute now plans to reach cruising speed on its projects and expand its business partnerships, so as to play its full role as an engine for the Grenoble economy.

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Learn more at (in French): <http://www.giant-grenoble.org/fr/recherche-et-technologie/92-irt-nanoelectronique/483-a-propos-de-l-irt-nanoelec>

Live from MINATEC

CEA's market research department turns 20

The CEA's market research department will celebrate its 20th anniversary with a special conference on July 5, 2013. The event will kick off with a Midi MINATEC brown bag lunch on the revival of innovation marketing, facilitated by Marc Giguët, President of Institut Européen de Stratégies Créatives. This will be followed by a retrospective and tours of CEA Tech's labs and showroom for some 150 CEA marketing alumni. The conference will conclude with a panel discussion on what the next 20 years hold in store for marketing at the CEA.

The department currently employs around 30 engineers specialized in innovation marketing and market intelligence. It churns out over 50 market research papers each year on topics like the competitive landscape, the positioning of products and services, benchmarking, and potential applications for new technologies.

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The 2013 First Step Challenge is now open!

After a promising first year in 2012, the CEA's First Step Challenge is being renewed this year with high expectations. The goal is to spot "out of the box" business ideas and support them with financial aid, expertise, and a fast, effective incubation program.

Out of the 14 business ideas selected 2012, 12 are on the road to becoming full-fledged start-ups: 8 are in the incubation phase, and 4 have received a total of nearly €860,000 to build demonstrators.

The First Step Challenge is intended primarily for permanent employees of the CEA's Technological Research Division, although the selection committee will examine applications from temporary employees on a case-by-case basis. Budding entrepreneurs have until June 14, 2013 to submit their ideas; those selected will begin their venture with a kick off meeting on September 11, 2013.

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CEA, France's second-largest patent filer in 2012

France's National Intellectual Property Institute (INPI) issued a list in April of France's busiest patent filers in 2012. The CEA edged up to second place with 566 patent applications, up from 545 in 2011. This puts it just ahead of Safran with 556 applications and well behind leader PSA Peugeot Citroën with 1,348 applications.

The INPI received a total of 16,632 patent applications in 2012, a slight 0.7% decrease from the previous year. Large French corporations again dominated the list, but with CEA in second place, CNRS in fifth place (383 applications), and IFP Énergies Nouvelles in seventeenth place (147 applications), France's research institutions are a force to be reckoned with!

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Live from MINATEC

Minalogic gives you a glimpse into the future

Imaginez le Futur ("Imagine the Future"), an interactive conference held by the Minalogic competitive cluster, will take place in Grenoble on July 4, 2013. It will be free of charge and open to researchers and industry professionals.

The event will kick off with a presentation on Minalogic's strategic goals for 2013–2018. This will be followed by talks on key challenges for the future like healthcare, energy efficiency, and smart miniaturized solutions. Live tweeting of the event will let people comment in real time.

The conference will also include exhibits of Minalogic's recent projects (including products and demonstrators), so participants can learn more about the cutting-edge R&D going on at the cluster and ask questions. Participants can also help envisage Minalogic's future by writing their ideas on Post-It notes and sticking them on a giant display board.

Visit www.minalogic.com for the full program and registration.
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Agenda

Until July 5 Grenoble Institute of Technology 2013 Summer School

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June 7 Grenoble Institute of Technology- Phelma MINATEC, Auditorium 001 Medicine and Materials Science Day

For medical and materials science researchers and professionals.
Free, registration required

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<http://www.lmgp.grenoble-inp.fr/le-laboratoire/journee-science-des-materiaux-et-medecine-539588.kjsp?RH=LMGP-PresentationEN>

June 10–12 Grenoble Institute of Technology- Phelma

National Micro and Nanoelectronics PhD Network Days

www.jnrmd2013.fr
Contact: info@jnrmd2013.fr

June 22–28 Autrans The Migas summer school

www.migas.fr

June 24–28 Leti Innovation Days

www.leti-innovationdays.com

July 1 Phelmaire 2013

For Grenoble Institute of Technology-Phelma faculty and staff

July 1–2 Franco-American workshop

For researchers, students, and faculty as part of the MINATEC Summer Program

Contact: summerprogram@mimatec.org

July 1–3 inMRAM

Conference on inMRAM
www.inmram.com

July 4 Imaginez le Futur a Minalogic conference

Full program and registration at www.minalogic.com

July 5 CEA market research department's 20th anniversary celebration

Contact: claire-noel.bigay@cea.fr

September 2 Classes start for Grenoble Institute of Technology–Phelma students

October 17 Grenoble Institute of Technology- Phelma Partners' Day

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MINA-NEWS >

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