

Event

Micro and nano-electronics design: Grenoble Institute of Technology to propose new apprenticeship program

In March, Grenoble Institute of Technology will present its pioneering new three-year initial training program to the Rhône-Alpes regional government. The new program would give micro and nanoelectronics design students hands-on learning opportunities through apprenticeships with companies in the industry. And Grenoble is home to a substantial number of high-tech companies—STMicroelectronics, Dolphin Integration, Asygn, Tiempo, and many others—likely to participate in the program.

Participating companies have a lot to gain. First, they would help counter the lack of a qualified workforce in this field, especially in RF and analog design. Second, they would get the opportunity to train students on their company's operations and know-how, since the students would spend half their time at the company. Finally, they would benefit from the program's practical nature—students' classroom work would take place in "project mode," just like in the workplace—since it is designed to enhance students' teamwork skills. In fact, one of the program's highlights is a project involving the design and post-fabrication characterization of an ASIC.

Students in the apprenticeship program would get the same instruction in engineering theory and scientific method as their peers in more traditional classroom-based programs.

The program has been in the works for two years. If the regional government approves it, the first incoming class (18 to 20 students) would start next September. It would also be the first apprenticeship-based micro and nanoelectronics design program in France.

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Innovation

Spintec reinvents the electronic compass

Spintec has just completed the first prototype of its patented integrated 3D compass. This innovation stands to overturn the existing technology, which uses costly and difficult-to-assemble discrete components. Spintec's prototype uses a pyramid-shaped chip containing four magnetoresistive sensors, one on each side of the pyramid, to obtain the three components required for the local magnetic field. The sensors have the same sensitivity, resolution, and heat drift, making heat-drift compensation simpler.

Electronic compasses are increasingly found in everyday items like wristwatches, smartphones, and GPSs. Spintec's technology reduces compass form factor, energy consumption, and cost, paving the way for a promising future.

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Femtocell base stations could require 20% to 40% less energy

Leti recently cut the energy requirement of a femtocell base station's radiofrequency transmission head by 20% to 40%, for a power output of more than 30 dBm. The EU project behind this development was carried out in association with Telecom Italia, Alcatel-Lucent, and Ericsson. The use of a dual-input antenna with excellent isolation properties plus a SOI-based linear amplifier with a dynamic adaptation system serves to relax the filtering system, making these substantial energy savings possible.

Femtocell base stations will play a crucial role in tomorrow's indoor 4G networks, and their energy consumption will need to be reduced. Leti is seeking a corporate partner to pursue the research and development work.

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Uranium renews hope for monomolecular magnets

After years of research on monomolecular magnets (also called magnetic molecules), scientists have renewed hope that such molecules could one day be used to develop molecular-scale memories. Researchers at INAC recently built a wheel-shaped molecular (uranium-manganese) structure whose hysteresis cycle and energy barrier could be compatible with the applications being targeted. However, these properties were obtained only at a temperature of 4K.

The ingenious idea that changed the course of the research was to use uranium in conjunction with the manganese usually used for these structures. The two materials were combined through an original synthesis method developed during past research. The scientists are now working on different architectures to raise the temperature at which the structure's magnetic properties are optimal.

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Innovation

Vibration energy harvesting: Leti files three patents

Leti researchers recently filed three patents for vibration energy harvesting microsystems. Their new technology counters one of the weaknesses of vibration energy harvesting systems: the systems' yields drop off sharply when their resonance frequency deviates from the ambient vibration frequency.

Currently, the best systems can tolerate vibration frequency differences of just 5%. But the first two systems designed by Leti maintain their energy yields in environments with vibration frequency differences of up to 40%. This was achieved by modifying the rigidity of the piezoelectric beam used in the system to alter its resonance frequency.

The third system designed by Leti can be used in environments with vibration frequencies of any magnitude—even non-periodic vibrations. However, some kinks still need to be ironed out.

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Memory: Leti researchers observe GST

Germanium-Antimony-Tellurium, or GST, is a phase-change material that passes from an amorphous to a crystalline state at temperatures of 100°C to 150°C, making it a good candidate for phase-change memory. However, when looking at GST samples under a transmission microscope, scientists observed that these properties actually turn into a disadvantage. During the ion-beam preparation phase, the sample gets so hot that it crystallizes, creating a crippling artefact.

A Leti research team worked around this hurdle by reducing the ion beam's output from 30 kV to 8 kV. The preparation phase is less accurate and twice as long at this lower power, but the thin (100 nm) film obtained is uniformly amorphous. The technique must now be fine-tuned to shorten preparation time and make it suitable for entire films.

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Spintronic devices in germanium at room temperature

We could one day see electronic components that combine electric and magnetic currents. A Grenoble-based team of researchers from INAC, UJF, Crocus, CNRS, and Thales has just made a step toward this potential breakthrough. The researchers injected spin-polarized electrons into germanium, a material compatible with microelectronics applications, at room temperature. They used a tunnel junction made from a magnetic material and magnesium oxide.

Silicon could not be used for this experiment since its physical properties make manipulating the spin current difficult. With germanium, the spin current remains polarized over distances of greater than 1 micron, making it a viable option. The researchers are now looking at designing a nanosystem using charge and spin. Their findings were published in *Physical Review Letters*.

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Leti duo wins Général Ferrié electronics award

Leti researchers Olivier Faynot and Claire Fenouillet-Béranger, along with two engineers from STMicroelectronics, won the 2012 Général Ferrié research in electronics award for their 15 years of work on FD-SOI. Their work has led to the development of a smartphone "super chip" at ST-Ericsson that slashes processing times by up to 35% while lengthening battery life.

FD-SOI now offers a potential solution to electronics makers' never-ending quest for more computing power—today's smartphone processors are as fast as PC processors—and longer battery life. The award was given in Paris in early December. A second ceremony will be held in Crolles at a date to be announced.

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Day by day

Prestodiag brings home new awards

The good news just keeps coming for Prestodiag, a start-up founded in 2012 to develop advanced INAC-ISB bacteria-detection technology. In the space of just a few months, Prestodiag won three awards for innovative start-ups, including one from the Génopôle Evry biotech cluster and one in the French Senate's entrepreneurship competition. Prestodiag's fast-detection method is truly novel in the food industry. Both reliable and robust, it can be used for all types of solid and liquid substances, delivering results before the bacterial culture has been completed (24 hours). The fast results mean that contaminated batches can be pulled before shipping.

A team of INAC researchers is continuing to improve upon the process. Prestodiag's first products should be on the market within the year.

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Microwaves and photonics to come together in the Vercors this summer

The MIGAS international summer school on microelectronics will be held on June 22–28, 2013 in Autrans (on the Vercors plateau). Around 50 PhD students, professors, researchers, and engineers from France and abroad are expected to attend. Speakers will include professors Ke Wu and Philippe Fauchet.

2013 marks the 16th year of the summer school. The program will cover integration technology for silicon photonics and microwave applications, areas in which Grenoble's research community is heavily involved. High-tech companies will be keeping a close eye on research in these fields, as the new technological developments will help them make smaller, more powerful, and less energy-hungry communication systems.

Lectures, panel discussions, and poster sessions will round out the program, giving participants an overview of the state-of-the-art in these fields and the chance to exchange ideas. Participants will also be offered a selection of social activities and a tour of MINATEC.

To view the program and to register, go to www.migas.inpg.fr
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Day by day

CEA-Grenoble enters Rhône-Alpes Challenge

Sponsored by the Rhône-Alpes regional government, the Rhône-Alpes Challenge brings together seven outdoor sporting events: cross-country and downhill skiing, mountain biking, cycling, cross-country running, kayaking, and free flight (paragliding and hang-gliding).

CEA-Grenoble will participate in this year's Challenge, which will be open to businesses for the first time. The research center will send a team of six athletes to compete in each event; employees are welcome to apply by sending a letter with sports-related references and a preliminary training schedule.

Athletic ability will not be the only factor taken into consideration when choosing the athletes for each of the seven teams; enthusiasm and the desire to represent the CEA are also crucial. The selection committee also encourages people of both genders and all ages to apply, so as to create the most representative teams possible.

Send your application to: rhone-alpes-challenge@cea.fr

MINATEC hosts 150 micro and nanoelectronics PhD students

Grenoble Institute of Technology-Phelma has the honor of hosting the 16th National PhD in Micro and Nanotechnologies Network Day (JNRDM), an annual event sponsored by the European Micro and Nanoelectronics PhD Network (RDEMN). This year's event will be held on the MINATEC campus on June 10–12, 2013.

Some 150 up-and-coming researchers from industry and academia will present the latest advances in French microelectronics and nanotechnology research. They will present their work at the conference's plenary and poster sessions. To spice things up, the conference will also include a slate of cultural and sporting activities as well as a gala dinner.

The event is being organized with the support of FMNT and CIME Nanotech.

Visit www.jnrdm2013.fr for further information.
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Nanomedicine: ETPN appoints new Executive Committee

Patrick Boisseau, head of CEA-Leti's nanomedicine program, was elected President of the European Technology Platform for Nanomedicine (ETPN) on 5 December 2012. The new Vice President, also French, is Nanobiotix CEO Laurent Lévy.

Founded in 2005, ETPN is coordinated by the European Commission and industry representatives to promote nanotechnology applications in medicine. The organization serves as an interface between nanomedicine scientists, clinicians, businesses, and EU government agencies. ETPN puts forward recommendations for potential research projects and facilitates the transfer of new technology deemed useful to Europe's highly-competitive nanomedicine industry.

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Grenoble Institute of Technology moves up in rankings

The 2013 *L'Etudiant-L'Express* engineering school rankings were published in mid-December 2012. Grenoble Institute of Technology-Phelma moved up four slots from the previous year. Ranked 17th out of around 100 schools, Phelma tied with the Ecole des Mines in Nancy and another Grenoble Institute of Technology school, Ensimag. Even though the rankings were tight, the school's four-slot rise should have a positive impact on students' and parents' decisions.

Phelma's efforts to develop international programs in English and to boost the number of foreign students, as well as the school's large number of PhD students and active research program, all contributed to the rise in the rankings.

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Atom probe tomography getting closer to artefact-free 3D reconstruction

Under the French National Research Agency (ANR) Aptitude program, which kicked off in January 2013, Leti plans to develop artefact-free 3D reconstruction methods for atom probe tomography. The research will lay the groundwork for the future 14 nm technology node and its new FINFET architectures and FD-SOI transistors. Scientists will need new characterization tools if they are to achieve quantitative 3D mapping of all atoms at the atomic scale. Current 3D mapping methods give distorted volumes. This project aims to correct the distortion by pooling the expertise of Leti (PFNC for characterization), CNRS-GPM (for algorithmic reconstruction), STMicroelectronics (advanced systems), and CAMECA (technology transfer).

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The Titan Ultimate delivers

A European Research Council program on single dopant detection by holography has given the Titan Ultimate transmission microscope yet another chance to prove its worth. The microscope, installed at PFNC in October 2011, delivers resolutions of 50 picometers, allowing researchers to see things they never could before. They can now use new techniques like chemical mapping and carbon-based materials imaging at the atomic scale, as well as imaging of fragile materials like nanotubes and polymers. A team of 10 operators has been trained to use the equipment for researchers at Leti, Liten, and INAC. Research currently underway includes dopant detection by chemistry and imaging, studies into graphene, batteries, and nanoelectronics systems, and joint R&D projects with PFNC partners.

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Grenoble Institute of Technology focuses on women in engineering

On March 7 2013, Grenoble Institute of Technology will hold a conference on the role of women engineers in businesses—the first event of its kind at the school. Today women account for just 20% of all engineers at the Grenoble Institute of Technology as well as in French companies. Businesses would like to achieve a gender-balanced workforce, making this a very topical HR issue. The afternoon conference will be open to students from all Grenoble Institute of Technology schools. The program will include several talks and four panel discussions, giving Grenoble Institute of Technology alumnae a chance to discuss the issue with current students.

At the end of the day, the Grenoble Institute of Technology Partnership Foundation will grant the "Promoting Women in Engineering" award to a school staff member in recognition of his or her efforts to encourage more women to pursue careers in engineering.

To view the program and to register, go to www.grenoble-inp.fr
Contact: relations.entreprises@phelma.grenoble-inp.fr

Interview

Grenoble Institute of Technology's Fanny Poinssotte*:

“Some 1,500 young people benefitted from our school outreach programs last year.”

From nanoscience classes and a robotics competition to the Science Fair and High Tech U, Grenoble Institute of Technology's school outreach programs are gaining in popularity. What do you think is driving this momentum?

The kinds of programs we run can really motivate students and broaden their horizons, especially for high-school students. We make three major contributions. First, our lab equipment is unlike anything most students see in their schools—and we want to show it off! Second, our researchers are experts in highly-specialized fields. Finally, our university students play a role by showing youngsters that they, too, can go to engineering school.

Which programs are the most effective?

Last year, we attracted nearly 1,500 youngsters for programs ranging from 4 hours to more than 60 hours. Special activities like clean room tours always make an impression, as does our extremely popular Science Fair.

Longer programs focusing on a single topic (which typically include tours, classroom instruction, lab experiments, and philosophical or ethical discussions)—like the nanoscience course at Grenoble's Mounier High School or the science course at a local middle school—are also very popular. We work with the kids' teachers to develop multidisciplinary courses.

And what about the scientists involved? Are they as enthusiastic as the kids?

We are lucky to have had several hundred researchers participate in our outreach programs in 2012, and all of them gave us positive feedback. What strikes them the most is how much they enjoy sharing their passion, and the sense of purpose they get from working with youngsters. For many students, our programs are the first time they think about issues like civic duty and activism. So, for all you scientists out there, we are always looking for more volunteers!

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*Head of Grenoble Institute of Technology's campus life and equal opportunity initiatives, and a professor of applied physics at Grenoble Institute of Technology-Phelma.

Horizons

INAC looks at solar cell dyes

KaironKem, which specializes in custom synthesis, now sells a line of purely organic dyes (orange, red, and purple) developed by INAC. These metal-free dyes are the result of research INAC has been conducting since 2009. The dyes' conversion yields still top out at 6%, but thanks to their high absorption they can cut the amount of titanium needed in electrodes by a factor of three—a boon in terms of solar cell production costs.

KaironKem is one of the first companies to sell the new dyes. The company initiated an EU-funded project with INAC and three other organizations in November 2012. The project aims to develop other 100% organic dyes and incorporate them into PV modules.

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Patrick Duréault elected Chairman of Phelma Board

Patrick Duréault, the General Manager of STMicroelectronics' Grenoble facility, was elected Chairman of the Grenoble Institute of Technology-Phelma Board on 6 December 2012. He succeeds Louis Zangara.

His role is to ensure that the 40-member Board—made up of elected students, staff, faculty, and company representatives—functions as intended. The Board is responsible for approving the school's budget, allocating funds to student clubs, and determining the number of students who will be accepted into the following year's incoming class. The Board also coordinates the school's investment and academic policies.

The Phelma Board Chairman also sits on the Grenoble Institute of Technology Board of Directors, playing a key role as a liaison between Phelma and its parent institution.

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Everything you need to know about Grenoble Institute of Technology admissions

The first-ever “Grenoble Institute of Technology Information Day” will be held at Ense³ on February 16, 2013, from 9 a.m. to 4 p.m. This new event will provide valuable information about Grenoble Institute of Technology's six engineering schools to students enrolled in high school, engineering school preparatory programs, university technology programs, and their families.

The Information Day will also cover Grenoble Institute of Technology's preparatory program—which incidentally turns 20 this year. Each school will have its own booth, where students and their parents can pick up brochures and ask questions. There will also be several talks about the schools' academic programs and careers in engineering.

Visit <http://goo.gl/nf6Tn> for further information.
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Phelma Junior Consultants to reach out to more businesses in 2013

Phelma Junior Consultants, the school's student-run consulting club, plans to reach out to more businesses in 2013 to help students refine their career plans. The club's company outreach activities will also give students a chance to promote the school and its academic programs.

Students are currently getting ready for upcoming tours of Elsys Design and Schneider Electric's R&D center. On March 7, 2013, a group of around 20 students will go to ESRF to tour the synchrotron and learn about the experiments conducted at the facility. A tour of CERN in Geneva has already been confirmed for November 2013. Phelma Junior Consultants will rent a tour bus for the CERN trip, which is expected to be popular with students.

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Horizons

Mobile telephony: Leti looking at 5G

The future 5G mobile telephony standard will probably not be operational until 2020. However, Leti—which recently completed two EU-funded research projects on “post 4G” technology—is already shaping tomorrow’s 5G with partners like France Telecom, Alcatel-Lucent, Vodafone, Sagem, and Nokia Siemens Networks.

BeFemto, the first “post 4G” project, looked at femtocell systems, which will one day replace Wi-Fi indoors. Artist4G, the second such project, explored cooperative systems for outdoor deployment. Both projects tackled the ever-present problem of cell-to-cell interfaces. The research has been presented at ten international conferences and three patents have been filed. Further research is already underway.

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Professional ethics competition open to students

The Rotary Club and the Conférence des Grandes Ecoles consortium will hold the 9th annual “Promoting Professional Ethics” competition this year under the patronage of UNESCO. The competition is open to students from three years post high-school to PhD level.

The competition participants—tomorrow’s decision makers—must write a five-page essay (individual or as a group) defending the personal values they will draw upon to shape the world of the future. They should also reflect upon the role of professional ethics and the societal challenges it raises. The essays can be on any topic, as long as it is related to ethics.

Essays for the first-round regional selection are due on February 28, 2013. National winners will collect their awards next spring at UNESCO. Winners will receive between €500 and €2,000. Are you ready to start writing?

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CEA-Grenoble to host KETs Summit on February 7, 2013

The Key Enabling Technologies (KETs) Summit—to be held at CEA-Grenoble on February 7, 2013—aims to spur crucial programs to get Europe back to economic growth and competitiveness, and to get politicians on board. The summit is being co-sponsored by French Minister of Higher Education and Research Geneviève Fioraso and French Minister of Industrial Renewal Arnaud Montebourg, and will be attended by European Commission Vice President Antonio Tajani as well as the Ministers of Research and Industry from several European countries.

Declining competitiveness has forced EU governments to implement economic stimulus programs. The six Key Enabling Technologies identified at the Summit will lay the groundwork for the innovation that is needed to jump-start the lagging European manufacturing industry.

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CEA Tech regional offices on the front lines

CEA Tech’s regional branches in Nantes, Bordeaux, and Toulouse have been working hard since early January to build ties with the academic and business communities in their regions. All three regional branches quickly found office space. The branches are headed by Xavier Apolinarski (LIST), Serge Rimlinger (Liten), and Nicolas Sillon (Leti).

More than 80 CEA employees applied for positions at the new branch offices, and most of the positions (for technical experts) have been filled. A second wave of hiring is planned for September of this year, when the branch offices will start rolling out their technology transfer platforms. At the same time, the CEA reached an agreement with the French government on the criteria that will be used to assess this experimental program.

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Clinatec continues to expand

The Clinatec R&D center has completed the major renovation work necessary to bring its facilities into compliance. The revamped center is now fully operational with a team of 90 researchers. And the center recently scored a big win with successful toxicology testing on Protool, a surgical instrument that can capture tissue (healthy or cancerous) for diagnosis. This opens the door to clinical testing, in which several biomedical research centers outside France have asked to take part.

Meanwhile, Clinatec’s project labs are already hosting three research projects. The first involves IRTSV and a start-up, and is looking at innovative technology for toxicity biomarker research and neurodegenerative and cancer treatment.

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Live from MINATEC

PhD students, save the date: 2013 JSIAM

The 5th Junior Scientist and Industry Annual Meeting (JSIAM) for GIANT PhD and post-doc students will be held at Maison MINATEC on April 5, 2013. The purpose of the event, which is expected to bring in around 40 industry representatives, is to maximize students’ contact with the business world.

The morning will be devoted to the role of PhD graduates in industry, with representatives from four high-tech companies participating in the discussion. A special Midi MINATEC brown-bag lunch will give PhD students an opportunity to present their work to potential employers via a 15-second video and poster. In the afternoon, professionals from the management section of the local employment office, Schneider Electric, and Wizbii will give students tips on CVs, job interviews, recruitment, and social media.

So, PhD and post-doc students, get ready! Potential employers are more likely to contact candidates with a video. And the maker of the best video will win a tablet.

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To learn more and to register, visit <http://www.minatec.org/jsiam2013>

Live from MINATEC

Solar Decathlon award-winning prototype to come to MINATEC

The team that represented the Rhône-Alpes region in the Solar Decathlon Europe 2012 competition will soon present its Canopea® solar home prototype at MINATEC. The prototype won the international energy-independent solar home competition for the Rhône-Alpes team last year. The prototype will be set up in April in front of MINATEC and will remain there for at least a year.

The winning team, made up of academics from a variety of fields, was coordinated by INES, solar-systems manufacturers in Isle d'Abeau, and the Grenoble and Lyon schools of architecture. Students from Ense³—Grenoble Institute of Technology's school of energy, water, and environmental engineering—also participated, as did researchers from G-SCOP and CEA-Leti.

The Canopea® solar home concept employs a series of small solar towers designed to control urban population density and offer the comfort of single-family dwellings—perfect for Grenoble's mountain environment, where buildable land is limited.

Learn more at: www.solardecathlon.fr
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Agenda

February 14–15 at the Grenoble Institute of Technology-Phelma campus

LMGP Scientific Research Days

Contact: colette.lartigue@grenoble-inp.fr

February 16 at Grenoble Institute of Technology-Ense³

Grenoble Institute of Technology Information Day for high-school, preparatory program, and college students and their families

<http://goo.gl/nf6Tn>

March 7 at Grenoble Institute of Technology

Conference on the role of women engineers in businesses and other organizations

www.grenoble-inp.fr

April 5 at Maison MINATEC Junior Scientist and Industry Annual Meeting

For PhD and post-doc students

<http://www.minatec.org/jsiam2013>

May 23 at the Grenoble World Trade Center

16th annual 4I forum

www.forum4i.fr

June 10–12 at Grenoble Institute of Technology-Phelma

National PhD in Micro and Nanotechnologies Network Day (JNRDM)

www.jnrmd2013.fr - info@jnrmd2013.fr

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MINA-NEWS >

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