Scientific Newsletter

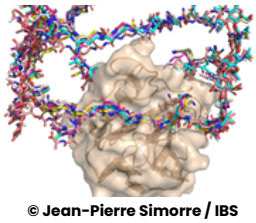
SPRING 2024

At the front page of IRIG

Enzymes react with the bacteria responsible for hospital-acquired pneumonia

Belonging to the pathogens responsible for hospital-acquired pneumonia, *Staphylococcus aureus* bacterium has become resistant to antibiotics. Researchers at IRIG have therefore studied an alternative treatment using Lysostaphin and LytM enzymes which interact with the bacterial envelope. It paves the way to targeted antibacterial strategies.

Jean-Pierre Simorre| IBS | *Nature Communications*, 2023



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On IRIG website

Looking for a needle in a nanofibers stack

The dynamic nuclear polarization technique is currently under development at IRIG. It made it possible to optimize the grafting conditions of a prodrug onto **cellulose nanofibers**, despite the very low grafting rates associated with the use of green chemistry.

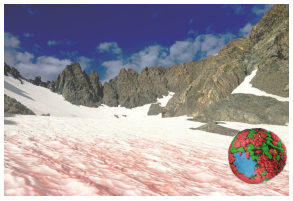
Sabine Hediger | MEM | *Communications Chemistry*, 2023

On IRIG website

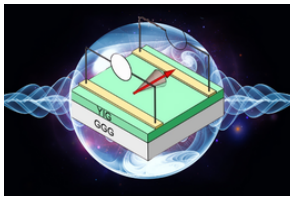
The life of the alga thriving in red snow sometimes called "blood snow"

In spring, Alpine glaciers sometimes turn a thin layer of red or orange. This phenomenon, known as red snow or "blood snow" in some regions is due to the proliferation of a microscopic alga called *Sanguina nivaloides*. Scientists at IRIG took an interest in this organism, which is at the basis of a poorly-understood microbial snow ecosystem.

Eric Marechal | LPCV | *Nature Communications*, 2023



On IRIG website



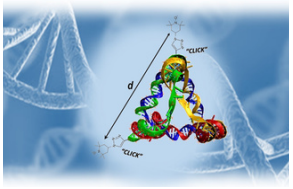
The current flows inside magnetic insulators

In the field of spintronics, researchers at IRIG have been studying yttrium iron garnet (YIG) for several years. This advanced magnetic material should reach a regime of superfluidity, where spin transport takes place without any energy loss. Are these extraordinary capabilities really possible?

Olivier Klein| SPINTEC| *Phys Rev B*, 2023

On IRIG website

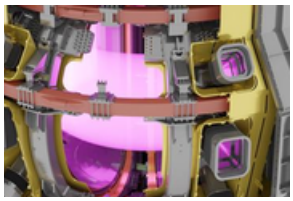
The mystery of the DNA pyramids solved by Electron Paramagnetic Resonance



Nanotechnologies based on the assembly of DNA are increasingly used in biotechnology, nanomedicine, nanophotonics and nanoelectronics. Researchers at IRIG have designed and characterised DNA nano-pyramids with unprecedented sub-nanometric resolution providing access to the parameters guiding the self-assembly process.

Didier Gasparutto | SyMMES | *Journal of Physical Chemistry Letters*, 2023

On IRIG website



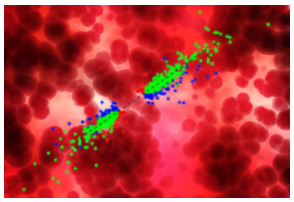
Simcryogenics simulation tool for JT-60SA

The simulation tools developed by the IRIG teams make it possible to predict the cryogenic cooling behaviour of the coils in a fusion reactor. As a result, the first experimental campaigns on the fusion plasma of the JT-60SA tokamak in Japan were carried out in complete safety.

François Bonne | DSBT | *Proceedings of the International Conference on Magnet Technology MT-28*, 2023

On IRIG website

The haploinsufficiency model of Rendu-Osler disease revisited



An IRIG team is conducting research into the mutation of the gene responsible for Rendu-Osler disease using transcriptomic analysis. Its results are leading to an improved model for understanding the origin of the disease.

Sabine Bailly | Biosante | *Angiogenesis*, 2024

On IRIG website

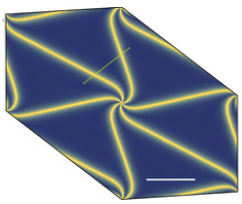
DNA-based metalloenzymes to improve the selectivity of an oxidation reaction

For a green and sustainable synthetic chemistry, researchers at IRIG are studying new artificial metalloenzymes to catalyze oxidation reactions. For example, they have succeeded in increasing the efficiency of the sulfoxidation reaction using an oligonucleotide attached to a polypeptide. This catalyst also makes it possible to control the selectivity of the reaction to favor the formation of one of the two possible enantiomers.

Caroline Marchi-Delapierre | LCBM | *The European Society Journal for Catalysis*, 2023

On IRIG website

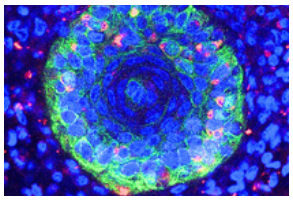
Giant atomic swirl in bilayer graphene



Physicists at IRIG have characterised a stack of two graphene sheets, only one of which is subjected to biaxial mechanical stress. They have demonstrated large-scale atomic relaxation associated to new electronic states.

Vincent Renard | Pheliqs | *Advanced Materials*, 2023

On IRIG website



Skin organoids to study Monkeypox

Faced with an epidemic of monkeypox, or Mpox virus, in 2022, researchers at IRIG have discovered that skin organoids represent a robust model for studying virus/host interactions and testing antiviral agents capable of limiting this infection.

Karine Raymond-Lebrin | BGE | *Nature Microbiology*, 2023

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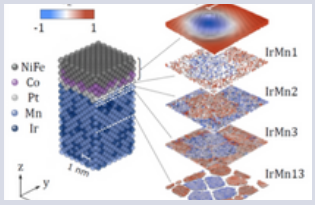
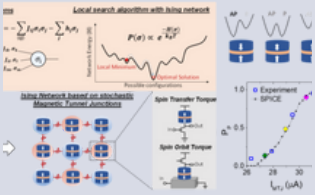
Other scientific news from laboratories



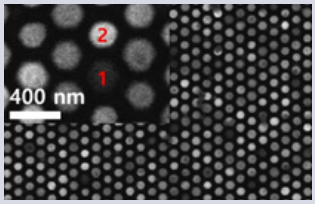
Local setting of spin textures in antiferromagnets

On SPINTEC website



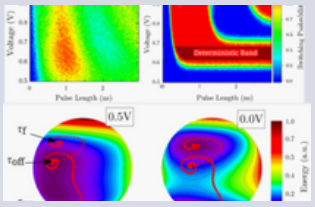
Resistively-coupled stochastic MTJ for energy-based optimum search

On SPINTEC website



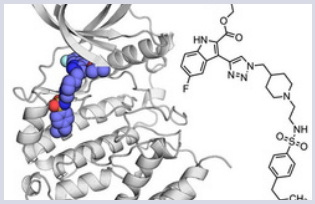
The tree or the forest: A method for the statistical analysis of the optical properties of a range of InGaN nanowires

On PHELIQS website



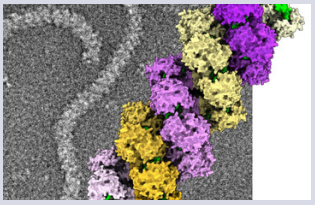
Deterministic switching in Voltage Controlled Magnetic Anisotropy Magnetic at Cryogenic Temperatures

On SPINTEC website



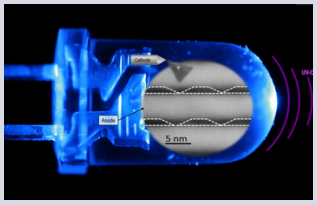
Targeting differently the CK2 protein kinase as an example

On BIOSANTE website



Highlights on the Influenza virus genome organization

On IBS website

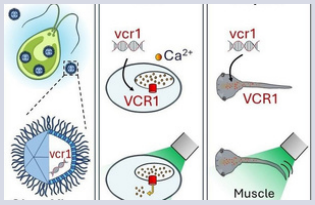


Towards safer UV disinfection with advanced AlGaN semiconductor solutions

On PHELIQS website

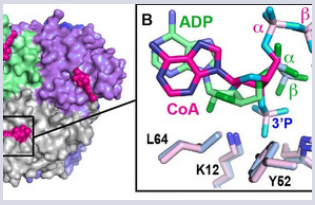
Pressure on solid-state batteries: a breakthrough

On SYMMES website



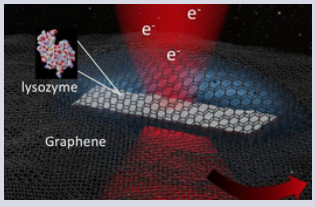
Photocontrol of intracellular calcium by a new class of viral rhodopsins: application to light-mediated restoration of muscle contraction in paralized animals

On IBS website



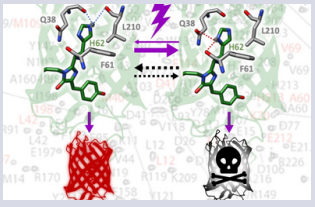
A new link between metabolism and epigenetics

On IBS website



Room temperature protein electron crystallography

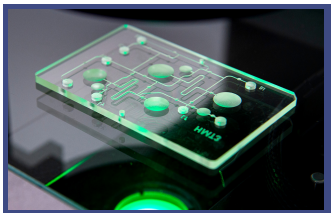
On IBS website



NMR reveals new secrets of fluorescent proteins used in super-resolution microscopy

On IBS website

Press releases – Prizes – Others



PEPR MED-OOC explores organoids on chip and has been approved by the Plan d'Investissement d'Avenir France 2030

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PEPR SPIN for frugal agile and sustainable digital tech

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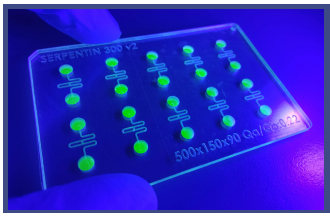

Teams at CEA-IRIG and CEA-LETI have developed an innovative microfluidic platform to ensure that organoids are properly vascularized, thus promoting their maturation *in vitro*.

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Collaboration with Vietnam supports solar fuels

On IRIG website

Philippe Sabon is recipient of the CNRS 2023 Collective Crystal for the Repotech project

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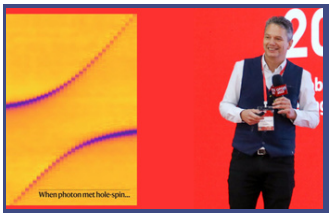

The SIF-SFP 2023 Friedel-Volterra Prize awarded to Silvano De Franceschi

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Rebekka Wild and Johan Decelle are 2024 CNRS bronze medals winners

On IRIG website

The Amylen project led by researchers at LCBM is developing new materials for producing electricity from water vapour.

On LCBM website

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