Scientific Newsletter

SUMMER 2023

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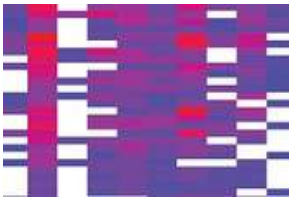
At the front page of IRIG

Deregulation of autophagy alters tumor progression



Autophagy is a recycling system of macromolecules that allows cells to survive critical situations such as nutrient deprivation and degradation of damaged organelles. This study demonstrates that many genes involved in autophagy are characterized by an increase in their expression variance without change in the average expression in tumors. This result sheds new light on this biological process whose overall effect on tumor progression and treatment response is contextual.

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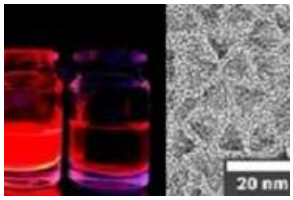
Xavier Gidrol | BGE | *PLOS Computational Biology*, 2023



Indium phosphide quantum dots see red and infrared

Researchers at IRIG have developed an original synthesis to produce larger InP quantum dots emitting in the near infrared. InP indium phosphide quantum dots are already used in our screens and displays. Other applications, such as solar energy conversion and in vivo imaging, are now possible with these new materials.

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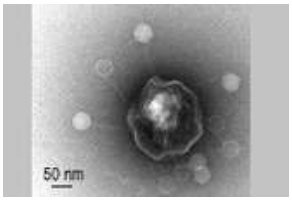
Peter Reiss | SyMMES | Journal of the American Chemical Society 2023

Elucidation of the trigger of infection of bacteria by their viruses



One promising alternative to antibiotics is the use of bacteriophages, the natural enemies of bacteria. Researchers at IRIG unveiled the infection of *E. coli* bacteria by bacteriophage T5 for better control and use in health, biotechnology, etc.

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Cécile Breyton | IBS | *Science Advances* 2023

Dynamics of electrons in a superconductor nanowire

Researchers at IRIG demonstrated that the injection of a very small number of free electrons into a superconducting niobium nanowire is enough to drastically reduce the critical current corresponding to the threshold of the superconducting state. The very low current thus generated breaks the bonds of electrons so-called Cooper pairs resulting in an accumulation of energetic electrons.

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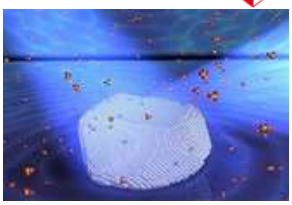
Claude Chapelier | PHELIQS | *Nature Physics*, 2023

How the facets of a platinum nanoparticle control catalytic properties



For the first time, researchers at IRIG and CNRS have used the ESRF synchrotron in Grenoble to measure the deformation of a single platinum nanoparticle in an electrochemical solution. This provides an in-sight into the properties of this material, which is used in particular as a catalyst in fuel cells and water electrolyzers.

Marie-Ingrid Richard | MEM | *Nature Materials*, 2023

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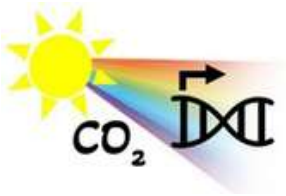

New insights on the regulation of CO_2 fixation in microalgae

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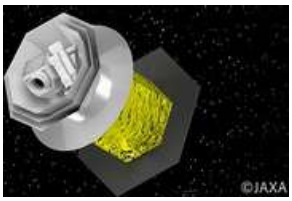
Although essential for microalgal growth, light and CO_2 are rarely available at optimal levels. To mitigate the effects of oxidative stress caused by too much light, microalgae activate a photoprotective mechanism that dissipates excess light energy in the form of heat, which is harmless. To ensure growth at low CO_2 concentrations, microalgae activate a mechanism that increases the amount of CO_2 available in their chloroplasts. Could there be a link between light and CO_2?

Dimitris Petroutsos | LPCV | *Nature Communications*, 2023

The origin of the Universe will be unveiled by the LiteBIRD cryogenic satellite



Following on from the Planck satellite in 2009, the Japanese LiteBIRD (Lite satellite for the studies of B-mode polarization and Inflation from cosmic background Radiation Detection) will be launched in 2032 to detect polarization signatures of fossil radiation emitted some 380,000 years after the Big Bang. It will carry ultra-sensitive telescopes equipped with cryogenic coolers specially developed by researchers at IRIG who have just assembled key thermal components.

Thomas Prouve | DSBT | *PTEP*, 2023

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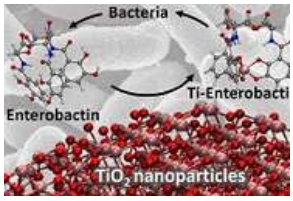

Solubilization of TiO_2 nanoparticles by a bacterial siderophore

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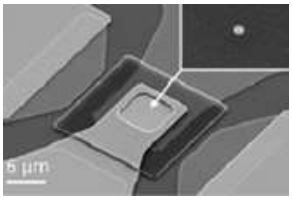
Titanium dioxide nanoparticles are widely used, for their white pigment and photocatalytic properties in consumer products (food, drugs, paint, etc.). Until now they were considered chemically stable and insoluble. But for the first time researchers at IRIG have demonstrated the solubilization of these nanoparticles in a biological medium by enterobactin a bacterial siderophore. From a health and environmental point of view the effects associated with solubilization should be questioned.

Isabelle Michaud-Soret | LCBM | *Biomolecules*, 2023

Spin-transfer tunnel junctions to miniaturize magnetic sensors



A new type of magnetic sensor, patented by IRIG in 2020, is based on spin-transfer tunnel junctions. It operates over a wide magnetic field measurement range and enables signal detection independent of the measurement range. These are significant improvements over conventional magnetoresistive sensors.

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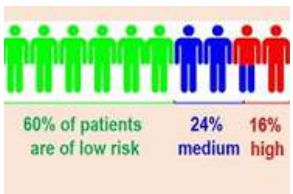
Ricardo Sousa | SPINTEC | *Sensors Journal*, 2023



Using genetics to identify kidney cancers most at risk

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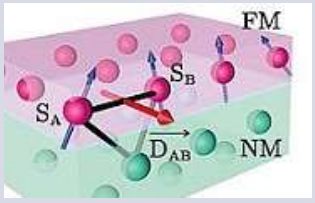
For personalized medicine, it is essential to identify cancer patients who are most at risk, in order to offer them appropriate treatment. Researchers at IRIG have demonstrated the prognostic potential of type VII collagen expression using data from kidney tumor samples.

Laurent Guyon | Biosanté | *Cancers*, 2023

Other scientific news of the laboratories



Review: from early theories of Dzyaloshinskii–Moriya interactions in metallic systems to today's novel roads.

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Searching outside the cell nucleus for sun-induced DNA damage.

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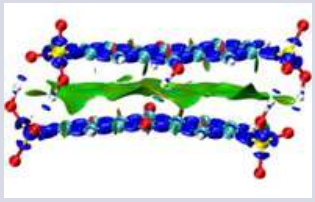

NMR: Everything you need to know about the organic electrolyte of a redox flow battery.

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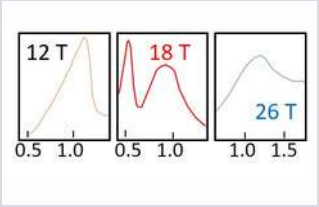

Tuning the pairing mechanism of a superconductor.

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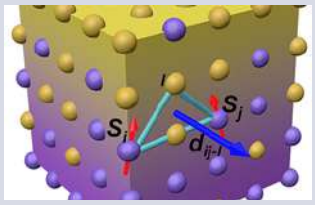

Gradient-Induced Dzyaloshinskii–Moriya Interaction.

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Fondation pour la Recherche Médicale

The "Entry and budding of enveloped viruses group" labelled ' FRM 2023.

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New contract for ITER-DMS cryogenic pellets.

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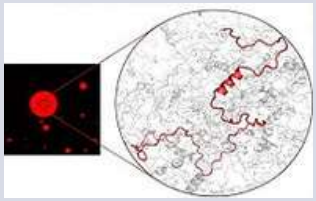

Liquid-Liquid phase separation modifies the dynamic properties of intrinsically disordered proteins.

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SMIS

Fluorophore photophysics and super-resolution microscopy get married in the SMIS simulator.

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Flora CLEMENT - Winner of the Junior Researcher Prize of the Espoir Isère association against cancer

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IInauguration of a new-generation PFIB-SEM

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Environment: red snow is increasingly present on the world's glaciers

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Professor Walid Rachidi receives an endowment of nearly €60,000 from the association « Jetons cancer »

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