Best of Last Week – Dark matter acting like pions, changes to astronaut skin and illusion of knowledge by experts

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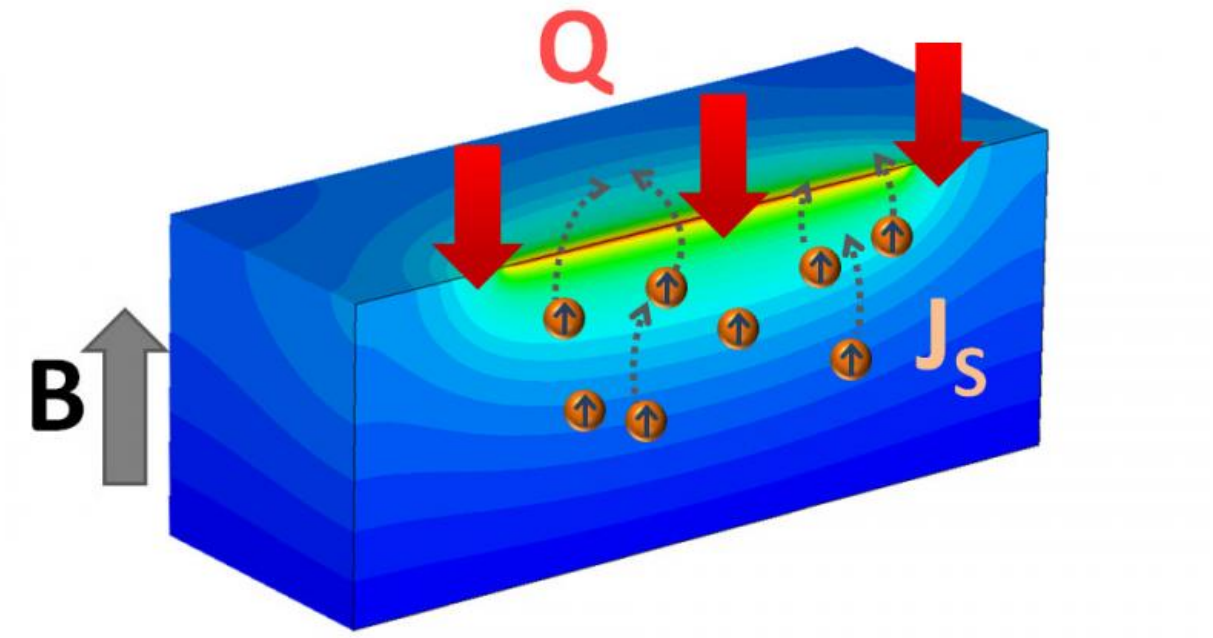

Typically when referring to electrical current, an image of electrons moving through a metallic wire is conjured. Using the spin Seebeck effect (SSE), it is possible to create a current of pure spin (a quantum property of electrons related to its magnetic moment) in magnetic insulators. However, this work

demonstrates that the SSE is not limited to magnetic insulators but also occurs in a class of materials known as paramagnets. Since magnetic moments within paramagnets do not interact with each other like in conventional ferromagnets, and thus do not hold their magnetization when an external magnetic field is removed, this discovery is unexpected and challenges current theories for the SSE. New ways of generating spin currents may be important for low-power high-speed spin based computing (spintronics), and is also an area of great fundamental interest. The paramagnetic SSE changes the way we think about thermally driven spintronics, allowing for the creation of new devices and architectures where spin currents are generated without ferromagnetic materials, which have been the centerpiece of all spin-based electronic devices up until this point.

(Phys.org)—It was an interesting week for physics as a team made up of international researchers came up with a new theory that says dark matter acts like a well-known particle—they suggest it has similarities to pions, which bind atomic nuclei together. Also, a macroscopic quantum phenomena was discovered in ice by a team of researchers in China—at very cold temperatures the ice behaved in a way that could only be explained by quantum tunneling, a rare example of quantum phenomena emerging on a macroscopic scale.

In other technology news, a team with Escape Dynamics conducted tests with a thruster that showed that using microwaves to propel a craft into space might work, which could mean the end of multi-stage rockets that use propellants. Also a young scientist discovered that magnetic material is unnecessary to create spin current—postdoce researcher Stephen Wu made the discovery while working at the U.S. Department of Energy's Argonne National Laboratory. Also, interestingly, a team of researches looking into reports of astronauts' skin changing before and after missions, discovered that for at least two men, their epidermis grew thinner during their mission by 20 percent—though it is still unclear why

that happens.

In other news, a team of scientists proposed 3D graphene-like 'hyper-honeycomb' structures—the group with the University of Oklahoma believes they could make up a new family of 3D based graphene materials. Also, another team at the University of St Andrews in Scotland fed white blood cells micro-lasers causing them to produce light—the hope is that it will allow for tracking cells as they move through living organisms. Another team looked into how music alters the teenage brain and found that training, even as late as high school, can improve teen response to sound and improved hearing and language skills. And another international team of researchers asked, why do mitochondria retain their own genome? They still cannot say for sure, but they conducted tests looking to see if the mitochondrial genome encodes membrane proteins that are hydrophobic—if encoded in the nucleus, they would be filtered by a signal recognition particle and misdirected into the endoplasmic reticulum.

And finally, if you are an expert in your field, you might be more susceptible to alleging knowledge of information that was completely made-up—a team with members from Cornell and Tulane Universities found that self-proclaimed experts are more vulnerable to the illusion of knowledge. Something to keep in mind, perhaps before offering opinions that could come back to haunt you.