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Are you suffering from high-impact-factor syndrome?

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As a result of a mailing problem at the printing plant, many readers received their copies of the October 2014 issue of *APS News* very late in the month. We regret the lengthy delay, and we are taking action to ensure prompt mailing in the future.

Fusion Research Runs into Turbulence

By Michael Lucibella

A recent Department of Energy (DOE) advisory committee report about the future of U.S. fusion research has drawn strong criticism from academic researchers feeling squeezed by a tightening fusion budget and a shift in U.S. research priorities.

The Fusion Energy Sciences Advisory Committee (FESAC) issued a report written by its Strategic Plan Panel that highlights a number of top-priority science problems to solve in the next decade. The panel identified new facilities to build, but also a number of reductions and closures at existing facilities. More than fifty scientists, including lab directors, have written to the committee expressing their concern about the directions it recommends, and criticizing how the committee arrived at its conclusions.

The report delivered by the committee offers four different potential budget scenarios ranging from "modest growth" at about 4.1 percent per year over ten years to no growth at all. These funding levels were mandated in a congressional charge to DOE's Office of Science for a strategic science plan.

"[They are] not optimistic budget

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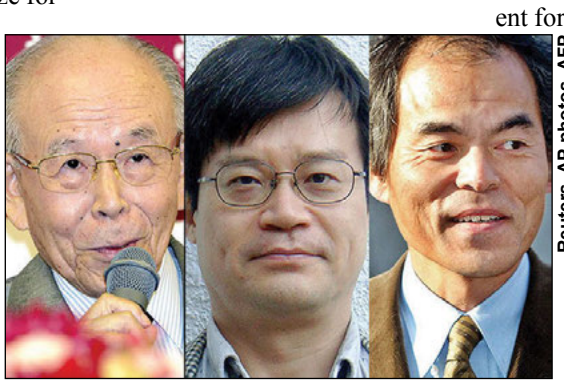
2014 Nobel Prizes for Advances in LEDs and Microscopy

By Michael Lucibella

Physicists received this year's Nobel Prizes for both physics and chemistry—the physics prize for the invention of efficient blue LEDs, and the chemistry prize for surpassing the resolution limit long believed to constrain optical microscopes. The physics prize went to Isamu Akasaki of Meijo University and Nagoya University, Hiroshi Amano of Nagoya University, and Shuji Nakamura of the University of California, Santa Barbara. In announcing the award, the Nobel Committee emphasized that the work done by the physics prize winners launched a revolution in energy-efficient lighting. The chemistry award went to Eric Betzig of the Howard Hughes Medical Institute, Stefan W. Hell of the Max Planck Institute for Biophysical Chemistry, and William E. Moerner of Stanford University for their contributions to the development of "super-resolved fluorescence microscopy."



Reuters, AP photos, AFP

Physics laureates Isamu Akasaki, Hiroshi Amano, and Shuji Nakamura

The Physics of Blue

"Thanks to the blue LED, we can now get white light sources [that] have very high efficiency and very long lifetimes," said Staffan Normark, the permanent secretary of the Royal Swedish Academy of Sciences. "This LED technology is now replacing older technologies."

Red and green LEDs have been around in more or less their present form since the 1960s, but blue LEDs proved much more difficult to fabricate. The difficulties lay in creating high quality gallium nitride crystals and then combining them with other elements to increase their efficiency. It took nearly thirty years of work in basic materials physics, crystal growth and device fabrication to create a marketable blue LED.

Akasaki started experimenting with growing pure gallium nitride crystals in 1974, first at the Matsushita Research Institute in

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Profiles In Versatility

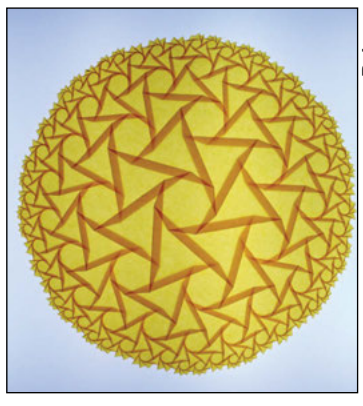
Right Brain, Left Brain: Physicists as Artists

By Alaina G. Levine

The next time you saunter through a museum or gaze casually at a piece of art, ask yourself: Did a physicist make this? It seems lately that one can't peruse a science magazine or website without finding articles about scientists who have turned their love of nature into beautiful works of art. And not surprisingly, physicists are numerous among this population. Whether it is art that is steeped in scientific principles, or pieces whose creation requires scientific and technical knowledge, these physicists are leveraging their expertise to craft truly unique art that gives us the opportunity to question our world in singular ways.

Julian Voss-Andreae is a sculptor with a background in physics. When he was a child, he had a very specific career plan in mind: "First I wanted to be a goldsmith, then a chemist and then an artist," he says. "From early on, art has intrigued me. I was always more interested in the aesthetics and feel of something rather than the intellectual depth of a field."

But the siren call of science could not be overlooked. By the time he was 22, Voss-Andreae had read many science and math books and had become intrigued with quantum physics. He completed undergraduate work in the subject at Edinburgh University, Vienna University, and the Free University of Berlin, and he pursued a PhD in quantum physics. During that time



R. Lang

Robert Lang combines math and origami in "3^7 Hyperbolic Limit, opus 600."

Voss-Andreae realized he was more interested in the aesthetics of nature and expressing what he investigated via painting (and later sculpture), than conducting the research itself. He left Europe and enrolled in the Pacific Northwest College of Art in Oregon, from which he graduated in 2004.

"In art college, I had a tough time conveying my passion; most people seemed to think science was boring and cold," says Voss-Andreae. But that same passion gave him inspiration. "It gave me an idea, a niche for my work," he adds, and in fact, his first sculptures were of protein folds and he has since crafted buckyballs of various sizes. "My teachers said there's no artist who doesn't have a day job," he admits with a chuckle, yet Voss-Andreae has indeed found success–and fulltime work–as a sculptor. His career really took off in 2006 when he partnered with a gallery owner in Idaho who began marketing his works to wealthy collectors with second homes in the area.

Today, almost all of his pieces are commissions and all of them touch science in some way. His most recent project is a pair of sculptures on the University of Minnesota campus, entitled Spannungsfeld, a German word which means "tension field." The sculptures are of two figures sitting on their knees facing each other across a plaza, and if you glance at them head on, they seem to disappear. They call to mind his earlier work, Quantum Man, which produced the same disappearing visual effect.

Paul Friedlander, a self-described "kinetic light sculptor

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Retrial Granted to Jailed Iranian Physicist

By Michael Lucibella

Imprisoned Iranian physicist Omid Kokabee will be granted a retrial after spending more than three years incarcerated in Iran. A branch of the Iranian Supreme Court has agreed to accept Kokabee's appeal and revisit his case, possibly clearing the way for his release within a few months.

"Acceptance of the retrial request means that the top judicial authority has deemed Dr. Omid Kokabee's [initial] verdict against the law," Kokabee's lawyer, Saeed Khalili, was quoted as saying on the website of the International Campaign for Human Rights in Iran. "The path has been paved for a retrial in his case, and God willing, proving his innocence."

Omid Kokabee

Kokabee, a citizen of Iran who at the time was studying at the University of Texas at Austin, was first arrested at the Tehran airport in January, 2011. After spending 15 months in prison waiting for a trial, including more than a month in solitary confinement, he was convicted by Iran's Revolutionary Court of "communicating with a hostile government" and receiving "illegitimate funds" in the form of his college loans. He was sentenced to ten years in prison without ever talking to his lawyer or being allowed testimony in his defense.

Kokabee said in an open letter that the reason for his detention is his steadfast refusal to help Iran's military. Earlier this year, Kokabee received the APS Sakharov Prize for his unwillingness "to work on projects that he deemed harmful to humanity, in the face of extreme physical and psychological pressure."

The recent ruling by Iran's Supreme Court branch is a positive development for the imprisoned scientist. By accepting the retrial, the court effectively throws out his previous conviction and will reconsider both the conviction and the sentence. At present Kokabee is still in prison, but those close to him hope to secure a medical furlough for him because of a recent flare-up of medical issues related to his incarceration.

"In other cases, for instance, the courts have decided that the new sentence would be for time already served," said Elise Auerbach, the Iran country specialist for Amnesty International. "The most important thing is that he gets out of prison and gets the care he needs."

Over the three years of his imprisonment, Kokabee has developed a number of potentially serious health problems due to a lack of proper medical care. Already he's lost four teeth, and four more are in need of emergency attention. He's had heart palpitations and stomach

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pains, and he has passed at least five kidney stones. Two of the best treatments for kidney stones are drinking water and exercise, but Kokabee has had little opportunity for either.

"These problems are accumulating, which is common for prisoners in Iran," said Eugene Chudnovsky, chair of the Committee of Concerned Scientists. "They leave prison with permanent chronic conditions."

In August, Kokabee was transferred from the more open, political wing of Evin Prison to a single crowded "temporary" cell without windows, holding about 100 cellmates, with no access to the outside. The cells are dirtier and the food served there is worse than in the political wing, contributing to his health issues. Before being transferred he had been able hold physics classes with other political prisoners, for which he had been reprimanded.

At one point in July, while he was still in the political wing, a number of individuals in mufti were let into the prison grounds by the guards and attacked Kokabee and several other prisoners while they were exercising in the yard. It is unclear if this attack somehow prompted the relocation of Kokabee and a number of other prisoners to their current ward.

The court's decision to retry the case hinges on the fact that Kokabee was convicted under the section of Iranian law that covers interactions with "enemy states." Though there are no formal diplomatic relations between the United States and Iran, and ongoing contact is not particularly friendly, to qualify as an "enemy state," a country has to be at war with Iran.

"Technically, legally, the Iranian government is not in a state of war with the United States," Auerbach said. "It's sort of a technical argument, revolving around a technical point, but it does provide…[an] opportunity to legally void the sentence."

The court's decision comes at a time when international organizations have stepped up pressure on Iran to release Kokabee. Twenty-nine physics Nobel laureates signed a petition calling for his release, which was organized by APS, the Committee of Concerned Scientists, Amnesty International, and the International Campaign for Human Rights in Iran. These four organizations plan to deliver their petitions to representatives of the government of Iran in person.

Amnesty also collected more than 14,000 signatures on a petition calling for his release, and APS sent a letter to the president of Iran asking for leniency. In early October, students rallied at the University of Texas at Austin, holding pictures of Kokabee and calling for his release. "There's been a group on campus called Austin for Omid, and they've been very effective," said Herb Berk, one of Kokabee's physics professors at the university.

Starting in late October, the United Nations will begin its Universal Periodic Review of human rights in Iran. "[The Iranian government] would never have [made] this decision in the absence of a lot of pressure," Auerbach said.

The new Iranian president, Hassan Rouhani, has billed himself as a reformer who wants to strengthen human rights in his country and build ties with the rest of the world. Before traveling to the United Nations last year, he ordered the release of 11 of the most prominent political prisoners in the country. Though Rouhani himself is not coming to New York in October, human rights activists are hopeful that more political prisoners may be released. "If they want to release him, now is the right time," said Chudnovsky.

Still, Iran's human rights record under Rouhani is mixed at best. Since his election in 2013, the number of executions in Iran has increased, and the arrests of journalists and human rights activists have continued. "Overall we have not seen a significant improvement over the last year, since president Rouhani came to office," Auerbach said. "The hardliners are in control of the security apparatus and judicial apparatus of Iran."

Though ultimately the court could still decide against Kokabee, the reopening of the case was a cause for optimism. "To me this is a very helpful sign. It's a sign that the authorities are looking for a way out of this situation," Auerbach said. "I think the stars are aligned at this point. I think the Iranian government wants to make a goodwill gesture."

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Woods-Marshall continued her work with the Institute for Nuclear Studies under Fermi, and gave birth to her second son in 1949. She and her husband separated in 1954, and Woods moved to the Institute for Advanced Study in Princeton, and then to Brookhaven National Laboratory, before landing on the faculty of New York University in 1960. Her divorce from John Marshall was finalized in 1966, and she married a chemist, Willard Libby.

By then she had moved to the University of Colorado, although she later joined her husband at UCLA in 1973 as a visiting professor of environmental studies and engineering. There, her research shifted to devising new methods for studying annual changes in temperature and rainfall patterns using isotope ratios of oxygen and carbon in tree rings. The Libbys were both strong advocates for food irradiation, and Marshall-Libby (as she was now known) suggested treating certain fruits, for example, with gamma rays instead of malathion.

Prolific to the end, Marshall-Libby's last paper, on quasi-stellar objects, was published in 1984. She died two years later, on November 10, 1986, from a stroke brought on by anesthesia.

Further Reading:

C. Herzenberg and R. H. Howes. "Women of the Manhattan Project," *Technology Review* 96, 32 (1993).

R. H. Howes, Ruth H. and C. Herzenberg. *Their Day in the Sun: Women of the Manhattan Project* (Temple University Press, Philadelphia, 1999).

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and scientific artist," also has a love of physics which evolved as he "grew up in the space race," he says. With a mother who was an artist and a father who was a physicist at the University of Cambridge, he always envisioned that art and science would be lifelong pursuits but wasn't sure how they would evolve into a vocation. He studied physics in college, but a chance visit to an exhibition at the Hayward Gallery in London gave him a significant push toward art. The exhibit, entitled Kinetics, included pieces that all related to light. "Art is a very personal, experiential thing for the viewer. It moves you," says Friedlander. "I just fell in love with the art at the exhibit. That moment changed my life." He remained in physics to finish his degree and then immediately began his quest as an artist.

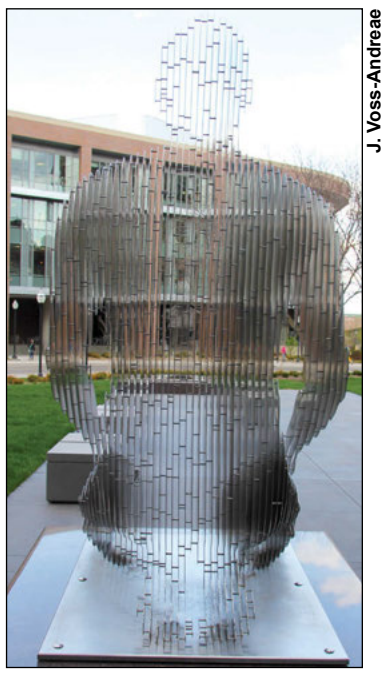
His work, which relies heavily on commissions and a few permanent installations, is also deeply influenced by physics, as all his pieces are focused on light. "When I look at light I have a feeling of being uplifted," says Friedlander, "I feel connected back to my love of the cosmos." His artistic tools are algorithms, computers, and light projectors, which he uses to design intricate figurines and shapes out of light. Naturally, his physics background aids him in thinking through the artistic and logistic problem of aesthetic expression while the physics itself serves as the subject of the art. For example, for his 2012 "Spinning Cosmos" installation in Montevideo, he collaborated with an astrophysicist to better understand spiral galaxies and then created spinning light sculptures which were lit with the astronomical data. The result was captivating: a room filled with rotating spheres of light with boundaries defined by calculations, formulae, and algorithms all describing the fabric of the universe.

Robert J. Lang, an origami artist who works in both paper and metal and who accepts commissions for both commercial and private collectors, is also a physicist who followed a professional artistic career after his formal science studies. Lang received his doctorate in applied physics from Caltech and worked in industry and for the Jet Propulsion Laboratory for almost 14 years, although he had been doing origami for almost as long as he could talk. "It's beautiful and elegant that all you need is a sheet of paper.… It was my passion my whole life," he shares. "I spent nights and weekends on art and the daytime on physics." But in 2001, the passion became too overwhelming and he quit his job at a Silicon Valley telecom firm to focus exclusively on art. "I continued to [do technology consulting] for a few years, but over that time the opportunities to work on origami continued to grow," he says.

Many of Lang's pieces draw directly from nature–for example, he has a whole series of mollusks,

T. Babinec

Physicist Thomas Babinec discovered painting as a creative outlet, as in his work "Terpsichore I."



J. Voss-Andreae

Artist Julian Voss-Andreae uses parallel metal plates to represent human forms in his sculpture "Spannungsfeld."

dinosaurs, and tessellations. But his work doesn't exist in a vacuum; indeed, he counts on and even contributes to the advancement of mathematical knowledge on which origami is based. "It touches many fields," he notes, "including combinatorics, computational geometry, folding theory, circle geometry and computational complexity theory," and he stays abreast of innovations in these subdisciplines as much as he can. In fact, Lang is a regular speaker at the International Conference on Origami in Science, Mathematics, and Education and is the author or co-author of many papers relating to the mathematics of origami folding. He continues to advance the field and wrote a computer program called TreeMaker, which is used to construct highly complex folds, flaps and angles for the origami base (the main part of an origami model) that are more intricate than anything a person can design by hand. "There's a tremendous number of relationships between folds," he describes. "For hugely complicated pieces, we can use mathematical ideas to define interfaces between structures."

And then there's Thomas Babinec, a postdoctoral fellow at Stanford University, who is still in the early phase of incorporating elements of applied and engineering physics, art, and business into his life. Unlike the other physicist-artists above, he was drawn to art only very recently: While a postdoc at Stanford, he ventured into an art store to buy a painting kit with a mission to produce art for his apartment walls. But he "discovered a special creative and expressive space with the brush," he says, and found he couldn't stop with just a few canvases. Initially he painted only for himself, but after sharing some of his abstract paintings with friends he began getting commissions and requests to sell his pieces. At the same time, he was taking a short course "Stanford Ignite," at the Stanford Graduate School of Business. So he launched The Art Experiment, a small hobby enterprise that allows him to combine elements of technical, aesthetic, and financial value creation. "I started painting because it was something that made me smile and because it provided a tool to look inwards while I was figuring out myself and my career," he says. "Now, I am always smiling."

These physicists count themselves as fortunate to be able to use both the right and left sides of their brains in their professions. But does their physics knowledge ever impede their artistic endeavors? "It radically changes your perception," says Voss-Andreae, noting how when he first started studying electromagnetism, "I couldn't look at light reflecting off a puddle and not see the underlying workings of E&M." However, "I am trying to transcend the purely reductionist view," he notes. "I'm trying to make myself richer by thinking of the wonder of just looking at something and not having to figure out the physics behind it but at the same time still be in awe of everything."

Alaina G. Levine is the author of Networking for Nerds *(Wiley, 2015) and President of Quantum Success Solutions, a science career and professional development consulting enterprise. She can be contacted through www.alainalevine.com, or followed on twitter @AlainaGLevine.*

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the physics community that affect LGBT physicists.

The committee grew out of LGBT+ Physicists, a group founded by Elena Long of the University of New Hampshire. She formed the small, informal forum in 2009 after finding few resources available for LGBT individuals once they completed their academic training. "There was really an entire lack of resources at the time," Long said. "I thought I would just start collecting them."

The group started meeting at the APS March Meeting, beginning in 2010. In 2012 the APS Committee on Minorities and the Committee on the Status of Women in Physics donated an invited session with 5 speakers to the group to present and discuss issues faced by LGBT physicists.

"APS and the LGBT+ Physicists group have been working together for a number of years," Long said. "We've kind of been building this relationship with APS from the start…. We're working to make the field of physics better and more inclusive."