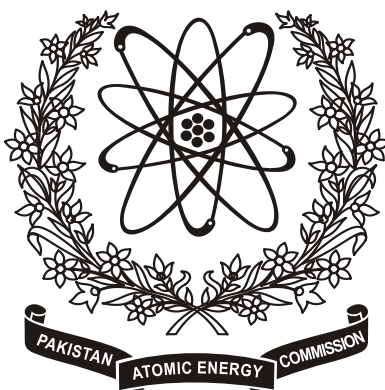


April-June 2021, VOL. 35, NO. 4-6



Glimpses from Recent Arrivals



**Scientific Information Division
Pakistan Institute of Nuclear Science & Technology
P. O. Nilore, Islamabad**

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Please see inside back cover for abbreviations used for journals/magazines scanned regularly.

This bulletin has been compiled by the Scientific Information Division, PINSTECH from the recent popular journals/magazines. Please encircle reference number on the Order Form for the full text of article(s).

Your comments/suggestions are highly appreciated.

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AGRICULTURE / BIOTECHNOLOGY / GENETIC ENGINEERING

PLANT GENE HAS NATURALLY CROSSED INTO INSECTS – AND HELPS THEM FEED (*NS-Apr. 3. 2021*) One species of whitefly, an aphid-like insect, has incorporated a portion of plant DNA into its genome that protects it from leaf toxins. It seems to be the first known example of so-called horizontal gene transfer between a plant and insect in which the transferred genetic material performs a useful function. *Donna Lu. (60)*

ARMAMENT / DISARMAMENT

APES ON A TREADMILL IN SPACE (*ACT-Apr. 2021*) In 1975, Paul Warnke published a celebrated article entitled “Apes on a Treadmill,” in which he criticized the wastefulness and the danger of the U.S.-U.S.S.R. nuclear arms race. Warnke likened the two superpowers to simian imitators who slavishly copy each other’s weapons deployments, endlessly pursuing and endlessly denying to the adversary any meaningful strategic superiority. *David A. Koplow. Julia Masterson. (61)*

IAEA BACKS OFF IRAN RESOLUTION (*ACT-Apr. 2021*) In early March and just days after the International Atomic Energy Agency (IAEA) director-general reached a temporary agreement with Iran to help the agency maintain essential oversight of Iran’s nuclear program, three key European powers advanced a resolution to the IAEA Board of Governors that would have censured Iran on the safeguards issue. The states were later persuaded to withdraw the proposal out of concern it would undermine prospects for restoring compliance with the 2015 Iran nuclear deal. *Julia Masterson. (62)*

EFFORTS TO RESTORE IRAN DEAL REMAIN STALLED (*ACT-Apr. 2021*) More than two months following the inauguration of President Joe Biden, the United States and Iran remain deadlocked over the process of restoring the 2015 nuclear deal. In recent weeks, however, the Biden administration appears to be signaling that it is willing to take a more flexible approach to coordinate the steps necessary for Washington and Tehran to return to compliance with the accord. *Kelsey Davenport. (63)*

CHINA FLIGHT-TESTS MISSILE INTERCEPTORS (*ACT-Apr. 2021*) Since the U.S. departure from the Anti-Ballistic Missile Treaty in 2002, several countries have accelerated efforts to develop or acquire missile defense technology, particularly theater-range interceptors, as a means of protection from other states’ offensive ballistic missiles. China is no exception and has continued efforts to develop and test anti-ballistic missile capabilities, even though it has objected to similar U.S. efforts. **(64)**

U.S. HYPERSONIC GLIDE VEHICLE FAILS TEST (*ACT-May. 2021*) A long-anticipated, first booster flight test of the Air Force’s air-launched hypersonic boost-glide vehicle, known as the Air-Launched Rapid Response Weapon (ARRW), failed on April 5. The test vehicle was meant to launch from a B-52 bomber, but “the test missile was not able to complete its launch sequence,” and the bomber returned to Edwards Air Force Base in California, according to an Air Force statement. *Kingston Reif and Shannon Bugos. (65)*

STATES CENSURE SYRIA FOR CHEMICAL WEAPONS VIOLATIONS (*ACT-May. 2021*) Member states of the world's chemical weapons watchdog have voted to suspend Syria's rights and privileges under the Chemical Weapons Convention (CWC) in an effort to hold that country accountable for repeated chemical weapons use. *Leanne Quinn and Julia Masterson. (66)*

IS THERE A NEW CHANCE FOR ARMS CONTROL IN THE MIDDLE EAST? (*ACT-June. 2021*) Regional rivalries have long bedeviled the Middle East, and as a result, true arms control and security negotiations have never taken place. Several recent developments offer hope that the momentum for regional progress on nonproliferation and disarmament can be revived, provided some conditions are met. *Marc Finaud, Tony Robinson, and Mona Saleh. (67)*

U.S. LIFTS MISSILE LIMITS ON SOUTH KOREA (*ACT-June. 2021*) Bilateral guidelines that have long restricted development of South Korea's ballistic missile program have been terminated, according to an agreement announced by President Moon Jae-in at his summit with U.S. President Joe Biden at the White House. *Sang-Min Kim. (68)*

ASTRONOMY / COSMOLOGY / SPACE SCIENCE

WE FINALLY KNOW WHEN THE FIRST STARS IN THE UNIVERSE SWITCHED ON (*NS-Apr. 3. 2021*) Between 250 and 350 million years after the big bang, cosmic dawn broke. Measurements of six of the most distant galaxies we have ever seen have allowed researchers to make the most precise calculations ever of when the first stars formed. "Before cosmic dawn the universe was dark and contained only hydrogen clouds, and now of course we are surrounded by all this beautiful cosmic structure and trillions of stars in the night sky," says Richard Ellis at University College London. "The question is, when did all this begin?" *Leah Crane. (69)*

IS THERE AN ANCIENT BLACK HOLE AT THE EDGE OF THE SOLAR SYSTEM? (*NS-Apr. 3. 2021*) Hints of a hefty source of gravity beyond Pluto sparked the search for a possible "Planet Nine". Now, some astronomers think it could instead be a black hole from the big bang, offering a rare glimpse into the early universe. *Stuart Clark. (70)*

MERCURY MAY HAVE SHRUNK BECAUSE MAGMA WAS BEING PIPED TO THE SURFACE (*NS-Apr. 3. 2021*) Mercury is a mysterious little world. Many features on its surface show evidence that since its formation, cooling of its core has caused the entire planet to shrink by between about 5 and 10 kilometres in radius, but for that shrinking to occur, heat must have somehow escaped. A series of simulations now show that it may have travelled from Mercury's core through its mantle via heat pipes. *Leah Crane. (71)*

THE US PLANS TO PUT A NUCLEAR-POWERED ROCKET IN ORBIT BY 2025 (*NS-Apr. 17. 2021*) The US is taking steps to put a nuclear-powered rocket in orbit by 2025, paving the way for navigation in space to become much easier. The Defense Advanced Research Projects Agency (DARPA) plans to turn the long-studied concept of a nuclear thermal rocket into a reality. The technology isn't powerful enough to launch a rocket from Earth, but could give a spacecraft propulsion for an extended period once in space. This would make it ideal for prolonged manoeuvring in orbit. *David Hambling. (72)*

STRANGE MUON BEHAVIOUR HINTS AT MYSTERIOUS NEW PARTICLES AND FORCES (*NS-Apr. 17. 2021*) The strange behaviour of a fundamental particle called a muon may hint at the existence of exotic particles and forces beyond the standard model of physics. We have had signs of this anomaly before, but a new set of measurements has increased the likelihood that it is real. Muons are electrically charged particles, so when they are placed in a magnetic field, they start to spin. Physicists can measure the frequency of that spin because of a phenomenon called precession, in which the spin axis of the particle wobbles slightly, allowing them to make what they call a wiggle plot. *Leah Crane. (73)*

NASA'S INGENUITY CRAFT MAKES FIRST EVER HELICOPTER FLIGHT ON MARS (*NS-Apr. 24. 2021*) NASA's Ingenuity helicopter has completed its first flight on Mars, making it the first vehicle to attempt powered flight on another planet. "We've been talking so long about our Wright brother's moment on Mars, and here it is," said MiMiAung at NASA's Jet Propulsion Laboratory in California, speaking from mission control just after the flight. *Leah Crane and Matthew Sparkes. (74)*

CHINA IS ABOUT TO START BUILDING A SPACE STATION IN ORBIT (*NS-May. 1. 2021*) China is about to launch the first section of a new space station, beginning an orbital construction project that is expected to end in 2022 with an outpost about a quarter of the size of the International Space Station (ISS). *Leah Crane. (75)*

NASA HAS PRODUCED OXYGEN ON THE SURFACE OF MARS FOR THE FIRST TIME (*NS-May. 1. 2021*) A NASA experiment on Mars has turned some of the Red Planet's tenuous, toxic atmosphere into oxygen. The Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE) landed on Mars with the Perseverance rover on 18 February and has now completed its first test. The atmosphere on Mars is mostly made of carbon dioxide. It is also 100 times thinner than Earth's atmosphere, so even if it did have a similar composition to the air here, humans would be unable to breathe it to survive. If we ever send astronauts to explore Mars, they will have to bring their own oxygen with them. *Leah Crane. (76)*

HOW TWO PLANETS LIKELY ACQUIRED THEIR BACKWARD ORBITS (*NS-May. 15. 2021*) All eight planets in our solar system orbit the Sun in the same direction, and none of their orbits lie more than a few degrees outside the Sun's equatorial plane. That alignment makes sense: All of the solar system's angular momentum came from the same place—the gravitational collapse of a much larger cloud of gas and dust—so it should all point in the same direction, right? *(77)*

ENORMOUS KITES FLOWN BY ROBOTS COULD HELP POWER A MARS COLONY (*NS-May. 15. 2021*) Any long-term base camp on Mars will need to be powered

by renewable energy. A proposal developed in response to a competition run by the European Space Agency suggests using a giant kite flown by robots to harness high Martian wind speeds, which could provide enough energy to sustain several astronauts in their everyday work. Producing and storing renewable energy on Mars is difficult. It is further from the sun than Earth, so it only gets 43 per cent of the sunlight. *Leah Crane. (78)*

CREWED LUNAR MISSION MUST LAUNCH BY 2025 TO AVOID DEADLY SOLAR STORMS (*NS-May. 29. 2021*) Solar storms that can injure or kill astronauts are more likely to occur at certain times of the solar cycle, a fact that should be considered during ongoing planning for humans to return to the moon, say researchers. The sun goes through a cycle that lasts approximately 11 years during which there is a spike and then lull in solar activity. Previously, it was thought that the largest solar storms occur randomly and were unconnected to this cycle, says Mathew Owens at the University of Reading, UK. *Matthew Sparkes. (79)*

THE HUNT FOR A PRIMORDIAL FORCE THAT WOULD REVOLUTIONISE COSMOLOGY (*NS-June. 26. 2021*) Finding magnetic fields dating back to the big bang would transform our understanding of how the universe evolved. Now astronomers think they're on brink of such a breakthrough. *Ian Taylor. (80)*

COMPUTER / INFORMATION TECHNOLOGY

QUANTUM INTERNET: THE RACE IS ON TO BUILD AN UNHACKABLE ONLINE WORLD (*NS-May 29. 2021*) Great leaps are already being made in creating a super secure quantum internet. It could overturn the role of information in our lives and give us a globe-spanning quantum supercomputer. **(81)**

ENERGY / NUCLEAR ENERGY

METHANE POWER COULD COME FROM LAKES AND RESERVOIRS (*AS-May. 2021*) In 1776 Italian physicist Alessandro Volta discovered something bubbling up among the reeds at the marshy end of a mountain lake. It turned out to be methane, a potent greenhouse gas produced by microbes living in the lake's sediments. According to the latest estimates, lakes and reservoirs account for 10 to 20 percent of global methane emissions, and scientists expect their contribution to rise because of climate change and nutrient runoff. *Julia Rosen. (82)*

HYDROPOWER DEVELOPMENT INITIATIVE FOCUSES ON CLEAN ENERGY TRANSITION (*The News-Jun. 27, 2021*) Pakistan is facing huge challenge of preparedness in the face of climate change impacts and their rapidly emerging threats, said Special Adviser to Prime Minister on Climate Change Malik Amin Aslam. Mr. Aslam was speaking at the Clean Energy Transition Summit organized here by Sustainable Development Policy Institute. **(83)**

ENVIRONMENT / ECOLOGY

UK SWITCH TO HYDROGEN VEHICLES WOULD NEED THOUSANDS MORE WIND TURBINES (*NS-Apr. 3. 2021*) Switching to hydrogen trucks, buses and cars in the UK would require about 2000 more wind turbines around the country's coast than if battery-powered vehicles were prioritised, a new analysis suggests. Battery electric vehicles are already the leading technology for shifting away from fossil fuel cars in the UK, with a record-breaking 108,000 sold last year. Yet there is still a debate over how best to decarbonise heavy duty vehicles, with hydrogen mooted as the answer by some firms. *Adam Vaughan. (84)*

AUSTRALIAN BUSHFIRES WARMED THE STRATOSPHERE BY 1°C FOR SIX MONTHS (*NS-Apr. 17 2021*) Smoke pollution from Australian bushfires in 2019 and 2020 warmed the stratosphere over the southern hemisphere by at least 1°C for six months, according to a new analysis. The devastating 2019 to 2020 bushfire season in Australia injected huge amounts of smoke into the stratosphere and led to record aerosol pollution. *Donna Lu. (85)*

LIMITING FOSSIL FUEL USE ISN'T ENOUGH – WE MUST STOP EXTRACTION TOO (*NS-Apr. 17 2021*) Fossil fuels aren't mentioned in the world's landmark deal for tackling catastrophic climate change. The 2015 Paris Agreement commits leaders to holding warming to 1.5°C above pre-industrial levels, or "well below" 2°C at the worst – but nowhere does it say how much oil, gas or coal must be left in the ground. This is convenient for world leaders, who are happy to talk about curbing fossil fuel demand, but desperate to continue business as usual when it comes. *Adam Vaughan. (86)*

BITCOIN MINING EMISSIONS IN CHINA WILL HIT 130 MILLION TONNES BY 2024 (*NS-Apr. 17 2021*) The carbon emissions associated with mining bitcoin have accelerated rapidly in China, and they will soon outstrip the total annual emissions of mid-sized European countries. Analysis by Guan Dabo at Tsinghua University in Beijing, China, and his colleagues suggests that the total carbon footprint of bitcoin mining in China will peak in 2024, releasing around 130 million metric tonnes of carbon. *Donna Lu. (87)*

'LOST' COFFEE PLANT CAN RESIST CLIMATE CHANGE AND TASTES JUST AS GOOD (*NS-Apr. 24 2021*) A rare species of coffee has been found to have a similar flavour to the varieties favoured by coffee growers for their high quality – but it is also more tolerant of the higher temperatures and more varied rainfall that are becoming increasingly typical of coffee-growing regions. *Ibrahim Sawal. (88)*

THE NITROGEN EMERGENCY: HOW TO FIX OUR FORGOTTEN ENVIRONMENTAL CRISIS (*NS-May 15. 2021*) Nitrogen pollution poisons our water and clogs our air – and it exacerbates other environmental problems. But if we organise now, we can fight back before it's too late. There is an invisible gas in Earth's atmosphere that is feeding an environmental crisis. The damage gets worse every year. If things are left unchecked, we are heading for a global disaster. And here is the most worrying thing about this gas: it isn't carbon dioxide. *Andrew Zaleski. (89)*

CLIMATE CHALLENGES MOUNT FOR PAKISTAN DUE TO SEA-LEVEL RISE (*The News-Jun. 23, 2021*) The frequency of tropical cyclones' formation in the Arabian sea has increased 10 times during last 20 years due to continuous rise in the sea-surface temperature and in the years to come the occurrence of more intense tropical cyclones is feared due to increase in the sea temperature. *M. Waqar Bhatti. (90)*

CLIMATE WORRIES (*The News-Jun. 26, 2021*) While Pakistan is not a major commercial producer of carbon emissions, it is one of the countries that most acutely feels the threat of climate change. It has been noted by meteorological experts from Pakistan and other countries that during the last 20 years, the frequency of cyclones developing in the Arabian Sea has grown by 10 percent. There is also apprehension that there could be a further rise in these numbers, while at the same time the increase in sea waters and their temperature means that there is a greater influx of water into land areas, threatening the ecosystem along the coastal belt, including mangrove swamps and other delicate structures. Agricultural lands along the 1000-kilometre coast that stretches from Sindh to Makran are also at risk as are people who could have no option but to migrate if the threat becomes too large. **(91)**

HEALTH / MEDICINE / SAFETY

ENGINEERED IMMUNITY: REDESIGNING ANTIBODIES TO BETTER FIGHT DISEASE (*NS-Apr. 3. 2021*) Antibodies are a vital weapon in our immune system's arsenal. Now we can redesign them like never before to boost our ability to fight cancer and viruses like HIV, says immunologist *Daniel M. Davis. (92)*

NEW FORM OF LIVER DIALYSIS COULD HELP PEOPLE WITH FAILED ORGAN RECOVER (*NS-Apr. 3. 2021*) People with liver failure may in future be able to recover by being hooked up to dialysis equipment to clean their blood of toxins. The idea is akin to kidney dialysis, when people with kidney failure regularly go to a clinic or hospital to have their blood cleaned of the waste products normally removed by the kidneys. The liver performs more complex functions, which until now couldn't be mimicked. But a new technique has shown promise. *Clare Wilson. (93)*

INFLATABLE IMPLANT INJECTED INTO THE SPINE COULD RELIEVE CHRONIC PAIN (*NS-Apr. 3. 2021*) A tiny, inflatable implant that can be injected into the spinal column could provide long-term relief from chronic pain. It works by emitting electrical charges that signal the brain to stop perceiving the pain. Spinal cord stimulation to control chronic pain in the body, arms or legs isn't new, but its effectiveness has been hampered by practicality issues, says *Damiano Barone* at the University of Cambridge. In order for such devices to work well, they must have up to 32 electrodes that snuggle up to the spinal cord. *Christa Lesté-Lasserre. (94)*

HANDHELD CAMERA THAT CAN SEE RADIOACTIVITY COULD HELP CANCER SURGEONS (*NS-Apr. 10. 2021*) Cancer surgeons may be able to find sites in the body where tumour cells have spread to by using a new kind of portable camera that detects gamma radiation as well as visible light. At the moment, gamma imaging is generally done using machines the size of a small room, which cannot be moved into an operating theatre. *Clare Wilson. (95)*

HOW TO KEEP YOUR BRAIN HEALTHY: THE 7 THINGS YOU SHOULD DO EVERY DAY (NS-Apr. 17. 2021) Keeping your brain in good shape will not only stave off mental decline, but can also improve your relationships and boost your well-being – and it's never too late to make a difference. *James Goodwin. (96)*

MULTIPLE NEGATIVE EVENTS BEFORE BIRTH COULD LEAD TO POOR MENTAL HEALTH (NS-May 8. 2021) Children who experienced multiple negative events before birth, such as exposure to alcohol or pre-eclampsia, are at higher risk of experiencing poor mental health a decade later. Joshua Roffman at Harvard Medical School in Boston and his colleagues asked the parents of almost 10,000 children aged 9 or 10 years whether the children had experienced a range of negative events before birth. *Krista Charles. (97)*

A BABY'S FIRST POO REVEALS IF THEY ARE AT RISK OF ALLERGIES AND ASTHMA (NS-May 8. 2021) Children could be set on a path to developing allergies, asthma and eczema before they are born. Analysis of a baby's first stool, known as meconium, shows that a lack of certain bio chemicals and gut bacteria normally seen in the faeces is linked with a higher risk of allergies and other conditions. *(98)*

EARLY SIGNS OF PARKINSON'S DISEASE COULD BE SPOTTED IN THE NOSE (NS-May 22. 2021) Signs of Parkinson's disease could be detected in the nose years before people develop more obvious symptoms of the condition. The finding could lead to the development of a nasal swab test for the disorder, similar to ones used for coronavirus testing, and may shed light on its causes, says Werner Poewe at the Medical University of Innsbruck in Austria. *Clare Wilson. (99)*

DOES EATING CELERY REALLY BURN MORE CALORIES THAN IT CONTAINS? (NS-May 22. 2021) There is a persistent claim that eating celery burns more calories than it contains, but the truth is a little more complicated. *James Wong. (100)*

PARTIAL SIGHT RESTORED FOR MAN WHO IS BLIND THANKS TO OPTOGENETICS (NS-May 29. 2021) A man who is blind has had glimmers of vision restored thanks to a high-tech treatment using optogenetics, which involves genetically altering nerve cells so they respond to light. French firm GenSight Biologics has published results showing that the first recipient of its treatment can recognise different objects in lab tests. "It's exciting to see the first publication on human optogenetics," says Ed Boyden at the Massachusetts Institute of Technology in Boston, a co-inventor of optogenetics. *Clare Wilson. (101)*

WHAT REALLY MAKES JUNK FOOD BAD FOR US? HERE'S WHAT THE SCIENCE SAYS (NS-June 12, 2021) Cut down on fatty food. No, sugar. Aim for a Mediterranean diet. And remember to eat more plants. The variability of healthy eating advice has become a cliché in itself. Yet despite all the contradictions, there is one thing that many agree on: we should avoid junk food. Until recently though, no one could give you a decent reason why. Gastronomic snobbery aside, science lacked an agreed definition of what junk food actually is, and that has made it difficult to know whether we should be avoiding it and, if so, why. *Clare Wilson. (102)*

YOU CAN CATCH COVID-19 TWICE, BUT THE SECOND BOUT IS LIKELY TO BE MILD (*NS-June 19, 2021*) Back in August 2020, a worrying report came in from Reno, Nevada. A 25-year-old man who had recovered from covid-19 in April had fallen ill with it again, and this time his symptoms were worse. He had tested negative for the virus in between bouts, so had been infected twice. Other reports of reinfection were also circulating at the time, raising fears that infections don't lead to long-lasting immunity. *Graham Lawton. (103)*

PSORIASIS DRUG COULD BE USED TO HELP PEOPLE STOP DRINKING ALCOHOL (*NS-June 26, 2021*) A medicine for the flaky skin condition psoriasis could be used to treat alcohol dependence. People with alcohol use disorders (AUD) who took the drug significantly cut their alcohol intake, a small trial has found. *Clare Wilson. (104)*

SCIENCE

CAN A NEW COLLIDER REVEAL THE LAST SECRETS OF THE HIGGS BOSON? (*NS-Apr. 3, 2021*) The most famous subatomic particle has revealed nothing we didn't expect – so far. Now physicists want to build a “Higgs factory” to better interrogate it for signs of new physics. FOR half a century, finding the Higgs boson was top of particle physicists' to-do lists. Its eventual discovery in 2012 was celebrated as the final piece of the puzzle to complete the “standard model”, our picture of reality at its most fundamental level. The Higgs became famous, a rare household name among elementary particles. *Thomas Lewton. (105)*

STEEL FOIL COATED WITH NANOWIRES DOES BACKFLIPS OUT OF WATER (*NS-Apr. 3, 2021*) Stainless steel foil that normally sinks in water has been made so water-repellent that not only is it unsinkable, it appears to defy gravity by jumping out of water too. JiannShieh at the National United University in Taiwan and his team chanced on the phenomenon after coating stainless steel foils thinner than a human hair with extremely water-repellent nanowires. These silica wires were grown on the steel wafers and then treated with a silicon-containing chemical called silane, which made them incredibly water-repellent. *James Urquhart. (106)*

QUANTUM COMPUTERS ARE REVEALING AN UNEXPECTED NEW THEORY OF REALITY (*NS-Apr. 17, 2021*) A powerful new idea about how the laws of physics work could bring breakthroughs on everything from quantum gravity to consciousness, says researcher. *Chiara Marletto. (107)*

PHYSICISTS HAVE CREATED A NEW AND EXTREMELY RARE KIND OF URANIUM (*NS-Apr. 24, 2021*) Researchers have produced the lightest version of a uranium atom ever. It has only 122 neutrons compared with the 146 neutrons found in more than 99 per cent of the world's naturally occurring uranium, which is known as uranium-238. Isotopes of an element always have the same number of protons – in uranium's case, 92 – but differing numbers of neutrons. Isotopes are labelled by the total number of protons and neutrons that their nuclei contain, and the new isotope has the lowest number of those particles ever at 214, making it uranium-214. *Leah Crane. (108)*

WHY ARE THEORISTS EXCITED ABOUT EXOTIC NUCLEI? (PT-May,2021)

Nuclei are at the heart of all palpable matter.¹ Although we understand the properties of things we touch every day—from the carbon in our bodies to the lanthanum in our cell phones—so much more may be revealed by investigating elements at the limits of their stability. Those limits become apparent when too many neutrons or protons are added to a nucleus. Matter falls apart in different ways, by emitting particles and radiation, say, or by fissioning into much lighter elements. Indeed, the world's elements seem to be finely tuned as a subtle interplay of components of the nuclear force. Those components can either hold a nucleus together or doom it to nonexistence. Filomena Nunes, *Michigan State University in East Lansing*. (109)

NUCLEAR IS CARBON-NEUTRAL (PT-May,2021)

I am curious whether Kramer omitted nuclear power by accident or by choice. Too often nuclear power is not considered for carbon-neutral power production, even though existing and advanced nuclear power technologies are widely accepted as carbon-neutral. Any serious discussion regarding either carbon-neutral energy production or hydrogen production should include nuclear power. Kevin A. Capps. (110)

FROZEN CLOUD OF MOLECULES ACTS AS A SINGLE QUANTUM OBJECT

(NS-May 8. 2021) For the first time, researchers have created a frozen cloud of molecules that share the same quantum state, meaning it behaves as if it were a single molecule. The arrangement provides a blank slate for experiments that could yield new materials, such as room-temperature superconductors. Cheng Chin at the University of Chicago and his colleagues formed a Bose-Einstein condensate (BEC) from thousands of caesium molecules, using lasers to remove their energy and cool them to near absolute zero. Matthew Sparkes. (111)

IS EVERYTHING PREDETERMINED? WHY PHYSICISTS ARE REVIVING A TABOO IDEA

(NS-May, 15. 2021) Super determinism makes sense of the quantum world by suggesting it is not as random as it seems, but critics say it undermines the whole premise of science. Does the idea deserve its terrible reputation? Michael Brooks. (112)

CLOUDS OF ATOMS TRAP LIGHT IN A WAY THAT COULD STORE QUANTUM

DATA (NS-May 22. 2021) Clouds of atoms can hide their light. When an atom moves to a lower-energy state, it emits a particle of light called a photon. But this process can be delayed and photons kept trapped inside a dense cloud of atoms, which may eventually prove useful for quantum devices that communicate using light. Leah Crane. (113)

LASER PULSES TRAVEL FASTER THAN LIGHT WITHOUT BREAKING LAWS OF PHYSICS

(NS-June, 05. 2021) The speed of light may not necessarily be constant. Light travelling through a plasma can appear to move at speeds both slower and faster than what we refer to as “the speed of light” – 299,792,458 metres per second – without breaking any laws of physics. (114)

TECHNOLOGY / NANOTECHNOLOGY / ELECTRONICS

GPS CYBER ATTACK FALSELY PLACED UK WARSHIP NEAR RUSSIAN NAVAL BASE (NS-Apr. 3. 2021) The recent naval dispute between Russia and the UK in the Black Sea may have involved a cyber attack as well as conventional weaponry, an analysis of vessel tracking data has found. Yesterday, Russia claimed to have fired “warning shots” at the UK Royal Navy destroyer HMS Defender for being inside “Russian waters”, although the UK Ministry of Defence denies any shots were fired at the Defender or that the ship was in such waters. *David Hambling. (115)*

UK NUCLEAR FUSION FIRMS MAKE PROGRESS TOWARDS PROVIDING CLEAN POWER (NS-Apr. 10. 2021) Two UK companies leading efforts to reproduce the way the sun makes energy are both on the way to hitting significant milestones in their attempts to commercialise nuclear fusion by the 2030s. On 25 March, Oxfordshire-based Tokamak Energy made its first plasma, the state hydrogen reaches when heated to very high temperatures, after a £25 million upgrade to its tokamak, the machines used to create fusion reactions. *Adam Vaughan. (116)*

REGULAR HEADPHONES CAN DETECT A HEART RATE AND HEAR YOUR CONVERSATIONS (NS-Apr. 17. 2021) Headphones can be made with built-in microphones, touch-sensitive buttons, motion sensors and even heart-rate monitors. But researchers have found a way to bring all these features to any existing pair of standard headphones, regardless of age or cost. The technique could replicate the advantages of smart headphones without the cost and environmental impact of producing new devices – and they could even be used to eavesdrop on a conversation or verify the identity of the wearer. *Matthew Sparkes. (117)*

FACEBOOK SAYS ITS AI COULD HELP FIND DRUG COMBINATIONS TO TREAT CANCER (NS-Apr. 24. 2021) Facebook claims that its new artificial intelligence can predict the way drugs interact with each other inside cells quicker than existing methods, enabling speedier discovery of new drug combinations to treat illnesses like cancer, but some researchers say it may not translate into results that will be useful in humans. The system, developed by Facebook AI Research and the Helmholtz Centre in Munich, Germany, is claimed to be the first easy-to-use AI model able to estimate how different drugs will work in the body. It could speed up our ability to uncover new treatments for diseases like cancer. *Chris Stokel Walker. (118)*

FACEBOOK VS AUSTRALIA AND THE NEW BATTLE TO CUT BIG TECH DOWN TO SIZE (NS-May 1. 2021) The public spat between Facebook and Australia earlier this year presages a new effort to regulate big tech companies – but could that threaten the whole future of the web? *Chris Stokel-Walker. (119)*

SMART SENSOR MEASURES HOW ITCHY YOU ARE BY HOW MUCH YOU SCRATCH (NS-May 8. 2021) Feeling itchy? A wearable sensor can measure how bad it is by tracking how often you scratch yourself. Itching is associated with many diseases and in some cases can be debilitating, but diagnosing chronic itching is difficult because there is no objective way to measure how it feels. Now, Steve Xu at Northwestern University in Illinois

and his colleagues have created a soft, waterproof sensor to do just that. It sticks to the back of a person's dominant hand, measuring the motion of their scratching as well as picking up sound waves generated by nails on skin. *Krista Charles. (120)*

'GREEN' BITCOIN ALTERNATIVE CHIA IS LEADING TO HARD DISC SHORTAGES (*NS-May 15, 2021*) Cryptocurrencies based on owning a large number of hard discs, rather than using computer processors, could offer a less energy-intensive alternative to bitcoin and might even make it cheaper to build data centres – although one is already causing soaring demand for hard discs that is disrupting supply chains. Bitcoin and several other popular cryptocurrencies are created, or mined, using a concept called proof of work, which involves solving computationally difficult puzzles that consume a large amount of electricity. Bitcoin's annual electricity consumption is estimated to be 148 terawatt-hours and rising, or around the same amount as Poland's. Now, rival currencies are emerging that instead make use of large numbers of empty hard discs, a concept known as proof of space. *Matthew Sparkes. (121)*

US NAVY IS DEVELOPING DRONES TO EXTREMINATE BIRDS' EGGS NEAR AIRFIELDS (*NS-May 15, 2021*) A new US Navy autonomous drone will seek out and locate birds' nests near airfields, armed with a device to prevent their eggs from hatching. Bird strikes are a serious risk to aircraft, and the US Pentagon spends around \$50 million a year managing birds around airfields. *David Hambling. (122)*

AN UNHACKABLE QUANTUM INTERNET COMES WITH TOUGH PRIVACY QUESTIONS (*NS-May 29, 2021*) When a powerful new technology comes around, people often split into two camps: those captivated by its benefits and those worried by the trouble it could unleash. This has happened with everything from knitting machines in the 16th century to artificial intelligence today. **(123)**

US ARMY SCIENTISTS CREATE A FORMULA FOR THE PERFECT WALKING ROBOT (*NS-June, 12, 2021*) The current generation of robots with legs are significantly less efficient than they could be, which means the future for such machines may be bright. *David Hambling. (124)*

GOOGLE IS USING AI TO DESIGN PROCESSORS THAT RUN AI MORE EFFICIENTLY (*NS-June, 19, 2021*) Engineers at Google have tasked an artificial intelligence with designing faster and more efficient processors – and then used its chip designs to develop the next generation of specialised computers that run the very same type of AI algorithms. *Matthew Sparkes. (125)*

DARPA DRONE INTERCEPTOR SEEMS TO BE ARMED WITH A FORM OF SILLY STRING (*NS-June, 19, 2021*) The US has developed a drone interceptor that fires what appears to be a form of Silly String into their rotors, bringing them down with minimal risk of accidental damage. The interceptor was created by the US Defense Advanced Research Projects Agency (DARPA). It is launched from a vehicle and guided by radar that can automatically identify and track small drones. *David Hambling. (126)*

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Glimpses from Recent Arrivals

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