

S. K. Mitra Memorial Lecture

Eighth S. K. Mitra Memorial Lecture organized by the Indian Science News Association (ISNA) was held on 4th October, 2018 at 4.00 p.m. in the N. R. Sen Auditorium of the University of Calcutta (Rajabazar Campus). Dr. Rajinder Singh, Department of Physics Education and History of Science, Physics Institute, University of Oldenburg, Germany delivered the lecture on “C.V. Raman, His Students and Calcutta School of Physics”.

Professor Sudhendu Mandal, Honorary Secretary, ISNA welcomed the audience at the beginning. In his welcome address, Professor Mandal highlighted the contributions of Indian scientists and also about the establishment of ISNA. According to Mandal, Calcutta School of Physics was the birthplace of pioneering achievement in physics made by persons like Acharya J. C. Bose, Acharya Satyendra Nath Bose, Prof. C. V. Raman, Professor Sisir Kumar Mitra and many others. He mentioned that Dr. Meghnad Saha founded this organization in 1935 with many other stalwarts of that time like Acharya P. C. Ray, P. C. Mahalanobis, T. R. Seshadri, D. S. Kothari, Sisir Kumar Mitra, B. B. Ray and others.

Professor Biswapati Mukherjee, Vice-President, ISNA and Chairman, Training Programme on Science Communication and Media Practice presided the event.

Professor S.C. Roy, Editor-in-Chief of *Science and Culture* introduced Dr. Rajinder Singh, to the audience.

Dr. Rajinder Singh in his talk explored Raman's relation with his students S.K. Mitra, discoverer of the D-ionospheric layer; B.B. Ray, a pioneer in X-ray spectroscopy; S.C. Sirkar, a specialist in optics and Kedareshwar Banerjee known for his work on magnetism, Raman and X-ray spectroscopy. S.K. Mitra obtained his D.Sc. degree of the

Calcutta University working under C.V. Raman. Strangely enough, he had no contact with Raman after that. The teacher-student relationship presumably soured when after the discovery of Raman effect in 1928, S.K. Mitra was asked to propose candidate for the physics Nobel Prize by the Nobel Committee, he along with D.M. Bose nominated M.N. Saha. It is also known that S.K. Mitra played a role in the event where Raman was forced to give up the directorship of the IACS.

B.B. Ray started his research career under C.V. Raman and obtained his D.Sc. degree on “The scattering of light by liquid droplets and the theory of coronas, glories and iridescent clouds”. Raman advised him to work in the laboratory of Niels Bohr. After his pioneering work on X-ray spectroscopy in Europe, he returned to Calcutta University, but found it hard to find even a room to set up a laboratory. Raman fought for B.B. Ray for a room that was occupied by U.N. Brahmachari. However, B.B. Ray finally fell into the fold of M.N. Saha and relationship with Raman became bitter. S.C. Sirkar worked with C.V. Raman on the relative intensities of Raman lines and obtained the D.Sc. degree. When Raman accepted directorship of the Indian Institute of Science, Bangalore, Raman requested Sirkar to proceed with him which he declined. In spite of his good work Raman was not happy with Sirkar and his



From left: Professor Sudhendu Mandal, Honorary Secretary, ISNA; Dr. Rajinder Singh, Speaker, S. K. Mitra Memorial Lecture; Professor Biswapati Mukherjee, Vice-President, ISNA; Professor S. C. Roy, Editor-in-Chief, Science and Culture; Professor Manas Chakrabarty, Honorary Secretary, ISNA after the lecture.

relationship with Sirkar was not cordial. K. Banerjee, known for his work on magnetism, Raman effect and spectroscopy, became M.L. Sircar Professor after K.S. Krishnan left IACS had a good relationship with Raman.

Professor Biswapati Mukherjee highly praised Dr. Rajinder Singh for delivering a wonderful lecture. Professor Mukherjee then felicitated Dr. Rajinder Singh with a memento and presented a book “Sir P. C. Ray, the Father of Chemistry Teaching and Research in India, a Philanthropist and an Entrepreneur” on behalf of ISNA.

There was an interactive session with the audience where Dr. Rajinder Singh answered to the queries of the audience on his lecture.

Professor Manas Chakrabarty, Honorary Secretary, ISNA offered vote of thanks. □

Celebration of Doctors’ Day by ISCA Kolkata Chapter

The National Doctors’ Day is observed every year on July 1 across India to express gratitude and acknowledge the dedication and commitment of the doctors towards our society. The observance of the day honours legendary physician and West Bengal’s second Chief Minister, Dr Bidhan Chandra Roy whose birth and death anniversaries coincide on the same day. Indian Medical Association’s (IMA’s) theme for 2018. Day is *Zero tolerance to violence against doctors and clinical establishment*.

The members of the Indian Science Congress Association (ISCA), Kolkata Chapter arranged a seminar on 2nd July, 2018 at 3 PM in the auditorium of the Indian Science Congress Association, Kolkata-700017 to celebrate the Doctors’ Day. In India, 1st July is celebrated as the National Doctors’ Day to pay homage to the legendary physician and second Chief Minister of West Bengal, Dr. Bidhan Chandra Roy. The members of ISCA, Kolkata Chapter as well as students from various colleges and institutes in and around Kolkata attended the event. The event started with garlanding the portrait of Dr. Bidhan Chandra Roy, and everyone present offered their respect and tribute to this legendary personality and visionary. In the beginning, Prof. Tusharkanti Ghosh, Convener, ISCA, Kolkata Chapter in his welcome address briefly mentioned about the significance of Doctors’ Day across the globe and the diverse reasons for which this day is celebrated worldwide to commemorate various things. After that, the

Chief Guest of the event, Prof. (Dr.) Ranabir Mukherjee, Director, Eye Care and Research Institute shared his memories of Dr. Roy from his college days as a student. In his brief yet insightful speech, Prof. Mukherjee enumerated the unique life and vital contributions of Dr. Bidhan Chandra Roy who devoted his life for the betterment of the people both as a physician and as an elected head of the Government of West Bengal. Dr. Manoj K. Chakraborty, General President, ISCA enlightened the audience about the work of five notable doctors from Bengal. However, he lamented that these physicians, despite their epoch making discoveries and path breaking work, did not get proper recognitions in their lifetimes. He talked about the seminal contributions of Dr. Subhash Mukhopadhyay, Dr. JB Chatterjee, Dr. Shambhunath De, Dr. Hemendra Kumar Chatterjee and Dr. Satinath Mukhopadhyay. Finally, the speaker for the event, Dr. Shanti Ranjan Dasgupta, Orthopaedic Surgeon, KCM Clinical Diagnostic Centre gave his lecture on the topic entitled *Fight All Your Battles on Your Knees*. He talked about the debilitating condition of knee osteoarthritis that interferes with the daily chores of the affected individuals. He stated about both the pharmacological as well as the non-pharmacological interventions that are used as remedial strategies for the knee osteoarthritis patients. The modern therapies available and frontiers of scientific research that are working on this particular area also were referred to in the course of his lecture. In the end, an open forum was held, where questions were invited from the audience and the speakers patiently answered to all their queries. The event came to an end with a vote of thanks offered by Dr. Amit Krishna De, Executive Secretary, ISCA. □

Sohini Basu
e-mail: sohinibasus9@gmail.com

Ig Nobel Prize 2018 Winners

Instituted by Marc Abrahams in 1991, the Ig Nobel Prizes are a hilarious parody of the Nobel Prizes and honour “achievements that first make people laugh, and then make them think.” Each piece of research honoured may appear to be ridiculous at first glance, but it is not devoid of a scientific merit. Indeed, some pieces of research honoured by the Ig Nobel Prizes have later led to serious scientific leads. Even one Ig Nobel Prize winner, Andre Geim, later received the Nobel Prize, although in a different discipline. The festivities include mini-operas, scientific demonstrations and the 24/7 lectures. Each of the awardees is required to explain his work twice – first a complete technical

description in 24 seconds and then a clear understandable summary in just 7 words. The acceptance speeches are limited to 60 seconds, and the time is strictly monitored by an eight-year old girl, nicknamed ‘Miss Sweetie-Poo’ who interrupts those who exceed the time-limit by repeating “Please stop. I’m bored.” until they stop. Each award has also a cash prize of Zimbabwe \$ 10 trillion, worth only a few U.S. cents. The science humour magazine *Annals of Improbable Research* covers the proceedings of the Ig Nobel Prize award ceremony.

The 28th First Annual Ig Nobel Prize Award Ceremony and Lectures were held on Thursday evening of the 13th September, 2018 at, as per the tradition, the historic Sanders Theatre at Harvard University, Cambridge, Massachusetts, USA. The past Nobel Prize winners Eric Maskin (Economics, 2007), Wolfgang Ketterle (Physics, 2001), Oliver Hart (Economics, 2016), and Michael Rosbash (Medicine, 2017) handed out the prizes. This year’s theme in the humour magazine was ‘The Hurt’, but a major portion of the winning research focused on other parts of the human body. The subjects, the names of the awardees, their research work and the respective publications are presented below in alphabetical order of the subjects.

Anthropology: Thomas Persson, Gabriela-Alina Sauciu and Elaine Madsen – for collecting evidence that, in a zoo, chimpanzees imitate human beings nearly as often and almost as efficiently as human beings imitate chimpanzees. *Primates*, **59** (1), 19–29 (2018).

Biology: Paul Becher, Sebastien Lebreton, Erika Wallin, Erik Hedenstrom, Felipe Borrero-Echeverry, Marie Bengtsson, Volker Jorger and Peter Witzgall – for demonstrating that wine experts can reliably smell the presence of a single fly in a glass of wine. *bioRxiv*, no. 20637 (2017).

Chemistry: Paula Romao, Adilia Alarcao and late Cesar Viana – for measuring the extent to which human saliva is a good cleaning agent for dirty surfaces. *Studies in Conservation*, **35**, 153-155 (1990).

Economics: Lindie Hanyu Liang, Douglas Brown, Huiwen Lian, Samuel Hanig, D. Lance Ferris and Lisa Keeping – for investigating whether it is effective for employees to use Voodoo dolls to retaliate against abusive bosses. *The Leadership Quarterly*, February 2018.

Literature: Alethea L. Blackler, Rafael Gomez, Vesna Popovic and M. Helen Thompson – for documenting that most of the people using complicated consumer products (like cell phones, DVD players, etc.) do not read the

instruction manual. *Interacting With Computers*, **28** (1), 27-46 (2014).

Medical Education: Akira Horiuchi – for the medical report “Colonoscopy in the Sitting Position: Lessons learned from Self-Colonoscopy”. *Gastrointestinal Endoscopy*, **63** (1), 119-20 (2006).

Medicine: Marc Mitchell and David Wartinger – for using roller coaster rides to hasten the passage of kidney stones. *J. Amer. Osteopathic Association*, **116**, 647-652 (2016).

Nutrition: James Cole – for finding out, by calculation, that the human body is not particularly high in nutritional value compared to that of most of the traditional meat diets. *Scientific Reports*, **7**, no. 44707 (2017).

Peace: Francisco Alonso, Cristina Esteban, Andrea Serge, Maria-Luisa Ballestar, Jaime Sanmartin, Constanza Calatayud and Beatriz Alamar – for measuring the frequency, motivation and effects of shouting and cursing while driving an automobile. *Cuadernos de Reflexión Attitudes*, 2005.

Reproductive Medicine: John Barry, Bruce Blank and Michel Boileau – for using postage stamps to test whether the male sexual organ functions properly at night. *Urology*, **15**, 171-172 (1980).

The ceremony still celebrates the publication of the following two books: ‘This Is Improbable Too’ and ‘The Ig Nobel Cookbook (vol. 1)’. The Ig Informal Lectures were held on Saturday, September 15, 2018 at 1:00 pm at MIT 10-250 (i.e. bldg. 10, room 250). In these improbably funny, informative, brief public lectures and demonstrations, the new Ig Nobel Prize winners tried to explain what they did and why they did it. □

*Professor Manas Chakrabarty, FRSC
Formerly, Department of Chemistry
Bose Institute, Kolkata
e-mail: chakmanas09@gmail.com*

Demise of Leon Lederman, NL, Father of ‘The God Particle’

Leon Lederman, an iconic figure in the domain of particle physics, a winner of Nobel Prize in physics in 1988 for the discovery of muon neutrino, a passionate advocate of science education and a former Director of the Fermi National Accelerator Laboratory (Fermilab) passed away on Wednesday, the 3rd October, 2018 at a nursing home in Rexburg, Idaho, USA at the age of 96.

He is survived by his wife and three children from his first wife.

Lederman was born on July 15, 1922 to Russian-Jewish immigrant parents in New York City. He graduated with chemistry from the City College, New York in 1943, served three years with the US Army in World War II and received his Ph.D. degree in particle physics from the Columbia University, New York in 1951. He joined the physics department of Columbia University in constructing a 385-MeV synchrocyclotron at Nevis Laboratories, Irvington-on-the Hudson, New York. This collaboration continued for nearly three decades, and Lederman served as the Director of Nevis Labs during 1961-1978.



Leon Lederman (15-07-1922 – 03-10-2018)

While working at Brookhaven National Laboratory at Columbia, Lederman discovered the long-lived neutral K meson in 1956. In 1962, he, along with Jack Steinberger and Melvin Schwartz, used a high-energy accelerator to produce a new type of neutrinos, viz. the muon neutrinos. This discovery led to their being awarded the Nobel Prize in physics in 1988. Lederman and his team found the first antinucleus, viz. antideuteron – an antiproton and an antineutron - in 1965 and discovered the bottom quark, a new family of heavy particles, in 1977.

In the early 1960s, Lederman proposed to form a National Accelerator Laboratory which eventually became the Fermilab. He became the Director of Fermilab in 1978 when the staff members of Fermilab and the greater particle physics community of USA were sharply divided. One of Lederman's critical achievements was his ability to bring cohesion between the two groups, shape Fermilab to become a world leader in particle physics and neutrino science during his Directorship (1978-1989) and help build Tevatron, world's highest-energy particle collider (until

2010). In fact, Lederman had to convince the top level physics community, the Department of Energy, President Regan's Science Adviser and the US Congress even to begin plans for the high energy proton-antiproton collider. Nigel Lockyer, the current Director of Fermilab, said, "*Leon Lederman provided the scientific vision that allowed Fermilab to remain on the cutting edge of technology for more than 40 years.*"

During his years at Columbia, 'Lederman developed a passion for science education and outreach'. During 1951-1978, he mentored 50 Ph.D. students, *none of whom was in jail* (a joke made by Lederman himself). He started the Illinois Math and Science Academy (1985), established the Saturday Morning Physics Programme in Fermilab and helped found the non-profit Fermilab Friends for Science Education. He was also the Founder-Chairman of the Teachers Academy for Mathematics and Science. In 2008, he set up shop at the corner of 34th Street and 8th Avenue in New York City to answer science questions from passersby.

Lederman also served as the Pritzker Professor of Science at Illinois Institute of Technology, as the Chairman, State of Illinois Governor's Science Advisory Committee and on the Board of the Chicago Museum of Science and Industry, and the Secretary of Energy Advisory Board. Lederman received, in addition to the Nobel Prize, many awards and honours during his lifetime. The list includes, *inter alia*, the National Medal of Science (1965), the Wolf Prize (1982), the Enrico Fermi Award (1992) and the Vannevar Bush Award (2012), the last one for his exceptional lifelong leadership in science and technology.

Lederman coined the term 'God Particle' for Higgs boson, the last missing piece of physicists' standard model of fundamental particles and forces, in his 1993 book, '*The God Particle: If the Universe is the Answer, What is the Question?*' This particle is believed to give mass to every other particle in the universe. Pertinently, Higgs boson was finally discovered in 2012. However, the coinage was strongly disliked by some physicists since it conflates religion and science.

Interestingly, Lederman's Nobel medal was put to online auction by Nate D. Sanders Auctions in 2015. The auction went into overtime until a final bid went unchallenged for half an hour. The medal was sold for \$ 765002 – the fourth highest ever paid among the 10 Nobel medals that have been sold in auction. The buyer's identity was not disclosed by the auctioneers. It is only the second medal to be sold by a living Nobel Laureate. Lederman hoped, it is stated, that the auction would raise "*the*

awareness of physics research in the United States and around the world.” According to Mrs. Lederman, they faced potentially costly medical bills and uncertainty following a diagnosis of dementia for her husband – this was possibly a crucial factor behind the decision of selling the Nobel medal.

In his last days, Lederman used to spend his life happily with his family members along with cats, dogs and horses. □

Professor Manas Chakrabarty, FRSC
Formerly, Department of Chemistry,
Bose Institute, Kolkata
e-mail: chakmanas09@gmail.com

Demise of Kepler, NASA’s Most Prolific Space Telescope

On October 30, 2018, NASA officials announced the death of Kepler, the most successful planet-hunting space telescope in history, after it had discovered thousands of exoplanets – alien distant stars – during its nearly a decade of journey in space since its launch.

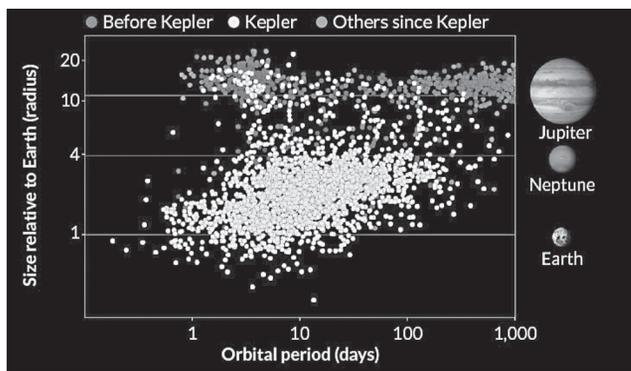
On March 14, 2009, Kepler was launched atop a Delta 2 rocket from Cape Canaveral and boosted into an orbit around sun and trailing earth. Its 95-megapixel camera was aimed at a patch of sky of the size of an outstretched hand near the constellation Cygnus which contains more than 4.5 million detectable stars. The camera served as a sensitive photometer that continuously measured the brightness of sun to detect dimming that occurs whenever a planet passes between earth (camera’s eye) and sun. A computer analysis of the ‘light curve’ caused by such planetary transits along with the timing of repeated cycles pointed to the existence of potential earth-like worlds in the habitable-zone orbits, i.e. Goldilocks zone. The lookout

for dips in the brightness of stars that could indicate an orbiting planet ‘was like trying to detect a flea crawling across a car headlight when the car was 100 miles away’. It was estimated that 2-12 planets discovered by Kepler are rocky and Earth-sized in the Goldilocks zone, and (20-50)% of the stars visible in the night sky could have planets like ours in the habitable zone for life.

Before Kepler was launched, only about 350 exoplanets were known to exist in our galaxy, and nearly all of them were of the size of Jupiter or larger. As of October 30, Kepler has led to the discovery of more than 2,680 newer exoplanets and statistically shown the existence of billions more of planets in the milky way. It found planets in all shapes, sizes and configurations: seven planets orbiting one star, planets orbiting at jaunty angles, planets with two suns, and planets more than twice as old as Earth. Moreover, these planets were formed at the beginning of the formation of our galaxy. According to NASA, Kepler’s observations showed that statistically there’s at least one planet around every star in our Milky Way Galaxy. It has further shown that some of these planets are at such a distance from their star and having such a temperature that there could be liquid water on its surface, pointing to the possible existence of some form of life therein. As stated by Bill Borucki, the first Principal Investigator of the \$ 692 Kepler mission, “*Kepler opened the gate for mankind’s exploration of the cosmos. The Kepler mission has been an enormous success.*”

Kepler monitored more than one third of those 3 lakh stars which are of right age and brightness to host earth-like planets. As stated by Paul Hertz, Director of Astrophysics at NASA, “*Because of Kepler we know that planets are an incredibly diverse set of objects, much more diverse than we observe in our own solar system. One of the common kinds of planets that Kepler detected are planets that are larger than earth and smaller than Neptune, a type of planet that does not exist in our own solar system.*” Kepler also revealed that solar systems have a variety of configurations (unlike our own) – solar systems with Jupiters orbiting their stars in only a few days, and rocky planets packed inside the orbit of Mercury are so close that the planets are in resonance with each other. The Kepler mission even helped to uncover last year a solar system with eight planets, just like ours.

For its observations, Kepler used to be kept rock-steady on three spinning ‘reaction wheels’ while a fourth one was available as a spare. In order to counteract the marginal pressure exerted on the spacecraft by sunlight, small rocket thrusters were used. Before facing the final



Exoplanet Discoveries/NASA

demise, Kepler had earlier fallen sick twice – once on July 14, 2012 when one of the wheels failed and then on May 11, 2013 when a second wheel malfunctioned. Scientists salvaged the spacecraft in 2014 when the renewed Kepler mission, known as K2, resumed its function. During K2, Kepler studied a variety of cosmic objects and phenomena, from comets and asteroids in our own solar system to far away supernova explosions. It has yielded more than 350 confirmed exoplanets.

In last June, a major drop in the pressure of the fuel tank was noticed, indicating that the tank of the spacecraft was nearly empty. At the end of October this year, the tank was finally completely empty. The last lot of the data recorded by Kepler were successfully gathered by the scientists before they lost control over the spacecraft. The demise of the 9.5 year-long life of Kepler was no doubt a sad event, but the community of scientists were ‘by no means unhappy’ since the spacecraft’s flight was more than twice the original target.

Hertz complimented Kepler as follows: “*The Kepler spacecraft may now be retired, but the Kepler data will*

continue to yield scientific discoveries for years to come. And the Kepler mission has paved the way for future exoplanet-studying missions.” Indeed, a new state-of-the-art planet hunter – Transiting Exoplanet Survey Satellite or TESS – has been launched in April, 2018 with a broader vision.

When the death was declared, Kepler was 94 million miles away from Earth. Before the spacecraft was left on its own to drift away in a safe and stable orbit around the sun, flight controllers, it is understood, had disabled the spacecraft’s transmitters. “*Kepler’s exoplanet legacy is absolutely blockbuster,*” said Kepler project scientist Jessie Dotson, NASA’s Ames Research Centre, Moffett Field, California. Kepler’s mission is “*stunningly successful,*” said Padi Boyd, a TESS project scientist. □

***Professor Manas Chakrabarty, FRSC
Formerly, Department of Chemistry,
Bose Institute, Kolkata
e-mail: chakmanas09@gmail.com***

Corrections : The author of the article “Brexit and its effect on the United Kingdom” published in the July-August issue has communicated the following corrections in his article: p.222: ‘Heinrich Himmler’ to be read as ‘Rudolf Hess’; ‘1942’ to be read as ‘1941’.