



# Conference Report

## Report of National Webinar, “National Science Day” held on 28<sup>th</sup> February, 2021

On the occasion of National Science Day on 28<sup>th</sup> February, 2021, Institute of Science, Education and Culture (ISEC), Kolkata organized a National Webinar through Google Meet online platform. In the inaugural session, Prof. Santanu Das, the Secretary of ISEC, wished all and talked about the theme of webinar. He said that discovery of Raman Effect by the great scientist Dr. C. V. Raman in 1928 had been indeed an auspicious research work at that time as India had then been ruled by the British Government. For this discovery, Dr. Raman was awarded the Nobel Prize in Physics on 28<sup>th</sup> day of February in 1930. For this, India celebrates 28<sup>th</sup> February as the National Science Day each year, and ISEC also celebrated the same online this year. After the brief introduction, Prof. Das invited Prof. Anil Kumar Ghosh, the President of ISEC, Kolkata to inaugurate the national webinar. Prof. Ghosh spoke about the significance of celebrating National Science Day and the discovery of Raman Effect. He told the mission and vision of ISEC and also spoke about Prof. Murali Mohan Biswas, the founder of the institute, and views of Prof. M. M. Biswas to all. Then he formally inaugurated the National Webinar of that day. After that Dr. Swapna Mukherjee, the Vice President of ISEC, Kolkata delivered the Welcome Address and also wished the success of the webinar.

In the Technical Session, Prof. Santanu Das introduced the first speaker, Prof. Sabyasachi Sarkar to all. He was then the Vice Principal, Durgapur Institute of Advanced Technology & Management, Rajbandh, Durgapur. The title of his speech was ‘Discovery of Electromagnetism’. In his lecture, first, he reviewed the history of Electromagnetism. He said that in 1598, William

Gilbert reported the earth as a huge magnet having entire typical property of a magnet as a load stone ( $\text{FeO-Fe}_2\text{O}_3$ ) as experimentally found by him. In 800 BC, the load stone was also mentioned in a Greek text. In his lecture, Dr. Sarkar said that the French Chemist and superintendent of French Royal Botanical Garden, Charles du Fay (1698-1739) realized repulsive and attractive forces of electricity in fluids, and in 1733, he also mentioned that. However, Benjamin Franklin (1706-1790) discarded those theories saying that the fluid had +ve and -ve energy that might flow, by doing the famous kite experiment (around 15<sup>th</sup> June 1752). On October 19, 1752, those experimental results were published. Prof. Sarkar also told that Sir William Watson (1715-1787) had stated that the positivity and negativity might be the surplus or deficiency of a single fluid. The French Physicist, Thomas-François Dalibard also did the kite experiment with 40ft iron rod around the same time when Franklin performed that experiment. As a result, Dalibard extracted electrical spark from the cloud. In his speech, Prof. Sarkar also told that Luigi Galvani and his wife had done experiment of Frog skin and noticed that once the metal touched the Frog skin, that Frog jumped due to static electrical effect. Galvani thought that it was due to activation of pelvic muscle of Frog and they considered that as animal electricity. Prof. Sarkar mentioned that H. C. Ørsted experimentally observed electricity on July 21, 1820. Michael Faraday, Davy did experiment on electromagnetism during the year 1831. James Maxwell (1831-1879), William Herschel also did experiment on electromagnetism, but Prof. Sarkar told that all these had been done after the discovery of electromagnetism. After his

deliberation, there was a nice interactive session between the speaker and the audience.

Next, Prof. Santanu Das introduced the second speaker, Prof. Subinit Roy. He was then the retired Senior Professor H, Saha Institute of Nuclear Physics, Kolkata. The topic of his lecture was 'The X factor of X Rays'. Prof. Roy said that W. Roentgen discovered X-ray accidentally on November 8, 1895 and on December 22, 1895 first image from X-ray was made. That was reported on December 28, 1895. For this discovery, W. Roentgen was awarded the Nobel Prize in 1901 that was the first Nobel Prize in its history. Prof. Roy discussed on the experiment by which X-ray was discovered. He also said the frequency range of X-ray is beyond the UV rays. Prof. Roy spoke about different properties of X-ray. He mentioned the absorption characteristics of X-ray and it was also used to restore images/ paintings, etc. Prof. Roy also said that X-ray can be used to map constituents of an object by utilizing characteristics of X-rays. The ray is formed through jumping of electrons from outer orbit of an atom to a lower orbit thereby emitting some X-rays known as characteristic X-ray spectrum. These characteristics of X-rays can be used to find out various elements present in an object. He showed that large concentration of lead, copper, zinc were found through X-ray fluorescent technic in Dhapa open surface solid compared with that of Madanpur area. Leaching happens, i.e. more percolation of toxic elements like Pb, Cu, etc. happens, deep into the sub-soil. However, less Cr and Cd leaching were noted. X-rays from the universe were detected to find different astronomical matters / phenomenon through X-ray telescope put up in an outer space outside the earth's atmosphere. Detection of the supernova explosion were made using X-ray telescope. There was a great interaction between Prof. Roy and the audience. It was discussed that X-ray information was also obtained from the movement of gases / particles moving towards a neutron star or black hole.

Then the Secretary of ISEC introduced another eminent speaker of the webinar, Prof. Kallol Bhattacharya. He is the Professor in Department of Applied Optics and Photonics, Calcutta University, Kolkata. His lecture topic was 'Adaptive Optics'. Prof. Bhattacharya said that adaptive optics is also referred as 'Untwinkle Stars'. The equation, ( $\theta_{\min} = 1.22 \lambda / D$ ) is important in this regard, where, D is telescope, or lens, diameter,  $\theta_{\min}$  is minimum angular separation and  $\lambda$  is wavelength where observation is done. When angular separation value is less than  $\theta_{\min}$ , two separate images of the same object is detected. Lower value of  $\theta_{\min}$  causes high resolution. He said this can also be done by increasing the diameter of objective lens of a telescope. He mentioned Newton's writing that atmosphere of earth distorts rays of stars. This is because the atom contains lot of layers of varying density and dust. Adaptive optics relates to capabilities of adjusting different conditions by optical conditions. Prof. Bhattacharya mentioned that example of adaptive control is the eye of an animal under varying light. Computers are used for corrective signal generation to the piezo sensor for deformation of mirror elements. All of the operations need multidisciplinary people to work together. He also told that adaptive optics are an add-on to a telescope, or in-built together. A guide star can be created to calibrate the optic system which gives 3 times the resolution of that of Hubble telescope. Further it can be raised up to 10 times of that of Hubble telescope. After this lecture, the audience and the speaker had also an interactive session.

At the end of the Technical Sessions, Prof. Santanu Das, Secretary, ISEC and Convener of this Webinar, delivered a vote of thanks to all members associated with this webinar. At the end of Webinar, there was a Cultural Performance by Dr. Manas Kumar Saha, a Life member of ISEC. He sang a Bengali modern song, 'Amar Bhitara bahire .....'. With this song, this day's webinar was concluded.

**Bandana Barman<sup>1</sup> and Santanu Das<sup>2</sup>**

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