Editorial*

N Sathyamurthy, Chief Editor

The December issue of *Resonance* invariably describes the work done by the Nobel Laureates of the year in physics, chemistry and physiology or medicine. Every year, I look forward to the announcement from Stockholm in the first two weeks of October about that year's Nobel Prize in each of the subjects mentioned above. Some announcements are along the expected lines, and some are not.

This year's Nobel Prize in Physics has gone to Roger Penrose for his work on black holes and to Reinhard Genzel and Andrea Ghez for their discovery of a supermassive object at the centre of our galaxy. The Prize for Chemistry goes to Emmanuelle Charpentier and Jennifer A. Doudna for developing CRISPER/CAS as a precision tool for gene-editing. The Prize for Physiology or Medicine is being shared by Harvey J. Alter, Michael Houghton and Charles M. Rice for their work on the Hepatitis C virus (HCV). While Jasjeet Bagla describes the work done by this year's physics Nobel Laureates, Rajesh Ramachandran describes the work of the chemistry Laureates, and Pradhan, Tripathi and Das describe the work on HCV.

The Prizes are awarded each year on December 10th. By the time this issue of *Resonance* comes out online or in your hands, this year's Nobel Prizes would have been awarded "online". This is the first time such a practice is being adopted because of the Covid-19 pandemic conditions.

The December issue features Nicolaas Bloembergen, who was awarded the Nobel Prize in Physics for the year 1981 for his work on nonlinear optics (NLO). I had the privilege of listening to him in person when he visited IIT Kanpur while he was in India as the

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Raman Chair of the Academy. I remember vividly, the tall gentle personality sharing his work with the audience. Debu Goswami, who had the privilege of interacting with Nico, as he was called, describes in an Article-in-a-Box the great work the man did cutting across disciplines, from NMR to NLO. Although Bloembergen's work was in physics, the ramifications cut across chemistry and biology. Works of many scientists cannot be compartmentalized. I never get tired of pointing out to young students how Venky Ramakrishnan the Physicist worked on a problem of interest in biology and was awarded the Nobel Prize in chemistry.

Many students in this country are forced to choose between mathematics and biology when they enter the 11th grade. Only some go against the current and choose mathematics AND biology. Much of the pathbreaking work in molecular biology has been done by physicists and chemists. Part of it is reflected in the Nobel Prizes that have been awarded over the years. One reason I am belabouring the point about multidisciplinary efforts of scientists here is the recommendation made by the committee while enunciating the National Education Policy 2020 to set up 'Multidisciplinary Education and Research Universities' (MERUs). Universities, by definition, are supposed to impart universal education and are supposed to be involved in teaching as well as research. Institutes like the IITs, IISERs, etc., cannot be considered as universities in the true sense, although they are empowered to award degrees by an Act of Parliament. Students of science need to pursue their studies in a subject of their choice, be it physics or chemistry or biology. But when it comes to asking fundamental questions about Nature and finding out the answers, they invariably have to take a multidisciplinary approach. Life cuts across all disciplines: physics, chemistry, and biology.

In addition to describing the work of Nobel Laureates and their persona, we have several other articles in this issue.

Jyotirmoy Sarkar shows how to slice a cube his way and generate triangles and pentagons and sum the labels. Govind Krishnaswami and T R Vishnu introduce the idea of a Lax pair and teach us how to read off conserved quantities in a dynamical sys-

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tem in part I article of a two-part series. V Satya Prakash discusses Chua's circuit and its simulation to illustrate the onset of chaos in a dynamical system.

A quick search of *Resonance* back volumes showed that we have published at least 13 articles on entropy over twenty years. And yet, we publish one more article on the subject in this issue. Nirupam Rohatgi explains the physical significance of entropy based on its definition in statistical thermodynamics.

Umer Saleem Bhat and Kavita Babu describe how neuropeptides are made and how they function in an organism, using *C. elegans* as a live model. Anuja Madhekar describes how India beat polio and became polio-free. The polio eradication strategy is particularly relevant today as we combat Covid-19 and go in for mass vaccination. Shweta Tanwar discusses the nature of science and how it has evolved over the centuries and the philosophical underpinnings.

This is the last Editorial I am writing as the Chief Editor as Professor B. Sury will take over as the Chief Editor of *Resonance* on 01 January 2021. I thank the Academy for giving me the opportunity to work as the Chief Editor for the last three years and extending full support during this period. As I have said earlier in these pages, I have gained more from being the Chief Editor than what I have given to the system. I have learned a lot from the variety of articles that have been submitted to the journal. I thank all the authors and the referees for their support to *Resonance*. I hope fervently that they will continue to contribute to the growth of the journal. Finally, I must add that without the editorial team, no issue would have come out. I thank my fellow Editors for the unflinching support they have given me during my tenure. I must also place on record my appreciation of the hard work put in by R Pushpavathi and Geetha Sugumaran of the *Resonance* team behind the scene, even during the pandemic times, in making sure that each issue came out on time.

Wishing all the contributors and readers of *Resonance* a prosperous and productive new year!