

# Editorial

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*Rajaram Nityananda, Chief Editor*

This is the last issue of 2015, which UNESCO declared to be a year of light and light-based technologies. We plan to carry a survey of the technological marvels of light in the next issue – we ran out of space and time to do it here! But we did manage to feature Charles Townes, one of the pioneers of the laser which is so much part of our lives, on the back cover. He was a towering figure during the early development of quantum optics, but also made a major impact on the study of molecules in space.

This issue carries two long articles on light. The first is an extensive exploration of the struggle by Einstein in the first half of the twentieth century to understand the very nature of light. He was sure of photons, but always felt he was missing something for nearly twenty years. That something came as a bolt from the blue – a letter from S N Bose, a teacher in Dacca University. This led quickly to the quantum theory of light, with which Einstein remained unsatisfied to the end of his days. Even for the practitioners of quantum theory, there was still something missing – a general mathematical framework in which the wave and particle aspects were manifest. And that had to wait for forty more years. The story of these further developments is kept for part II of this article, which will appear in the January 2016 issue.

The second article relating to light introduces a subject with a technical-sounding name – Radiative Transfer. Light traversing clouds, or coming out from the Sun, undergoes many events of emission, absorption, and change of direction. The result is not just additional complexity, but carries a beauty of its own, as our front cover testifies. The trapping of infrared radiation by the carbon dioxide we humans add to the atmosphere, and the consequent warming of the Earth we live on, are very well known... Astrophysics, too, is of course a fertile ground for practitioners of this subject.



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One might well think that an article entitled, ‘The power of small’, refers to the much hyped, trendy area of nanotechnology. But no, the article is actually on small, simple things we take so much for granted in modern medicine that we need to be reminded of what life must have before we had them – anaesthesia, painkillers, disinfectants, wheelchairs, and others. It is also a reminder that problems which affect billions of people can sometimes be addressed with simple, robust technologies. The reminder is much needed in our times. Medical research is driven, on the one hand, by the academic impulse to pursue what is scientifically the most challenging. On the other, it is driven by the commercial impulse which seems to be pushing the medical and pharmaceutical industries away from the needs of the majority, which would not generate much profit, and towards the most expensive solutions which only the advanced countries can afford. Countries like our own seem to have fallen into the trap of trying to imitate and catch up with a model which is being questioned even in a country like the United States.

A journey through the streets of Bengaluru means contemplating posters advertising brain surgery, liver transplants, knee replacements, and MRI machines packing more and more Teslas; all of which have their place, but surely not as part of a revenue model – in plain language, not as money spinners. One hopes that those who work on the basics will succeed in swimming against this tide, and receive their due.

And of course, what could be more back-to-basics than prime numbers?

