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YOUNG SCIENTIFIC MINDS WHO HAVE MADE INDIA PROUD WITH THEIR WORK

Theoretical physicist at BARC, Arun K Pati is also a visiting scientist at Institute of Physics, Bhubaneswar

Tell us a bit about your childhood

ARUN: I was born in a small village in Orissa and spent my schooling and college years in a small town. During my childhood I was more into arts and literature. I used to love painting and writing poems. Before thinking seriously about science I thought I would become a poet or a painter. For a while, I even thought of doing something in the film line. However, while doing my BSc, I realized that physics was very interesting. I still remember that feeling of wonder when learning about quantum theory and wave-particle duality. I thought it awesome that subatomic particles behaved simultaneously like waves and particles. My first impression was there had to be something wrong with this theory and that reality could be beyond this. That is how I was motivated to study quantum physics. Today, we know quantum theory is a truly remarkably theory of Nature and yet in reality, we do not know what these quantum entities are!

Who has been your inspiration in this field?

ARUN: In physics, like many others, I was inspired by great minds like Einstein, Schrodinger, Dirac, Heisenberg and others. In recent years, with the emerging field of quantum information theory (which tries to apply quantum mechanics to realize new and faster information processing devices like quantum computers and quantum teleportation), I have been largely inspired by C.H. Bennett. He is considered the found-

ing father of reversible computation and other developments in the field of quantum information.

What are your other interests?

ARUN: I still write poems and songs when I get the time. Other interests include painting and watching nature.

Tell us a bit about your present projects.

ARUN: All my present projects are mostly in the area of quantum information and the fundamental aspects of quantum theory. We have a new group in the area of Quantum Information and Quantum Computation at Harish-Chandra Research Institute, Allahabad. We are trying to understand the limits of quantum information processing, quantifying various non-classical correlations present in the quantum system and how one can utilise all this in information processing.

What are your favourite projects/books and why?

ARUN: My favorite projects were proving the (i) No-Deleting theorem and (ii) No-Hiding theorem. S.L. Braunstein from the UK and I had proved the No-Deleting theorem in quantum theory in 2000. This result proved that unlike classical information, quantum information cannot be deleted from two copies. Later, other scientists showed that the No-Cloning and No-Deleting theorems were connected to the conservation of quantum information. In 2007, we proved another result, which is now known as the No-Hiding

theorem. This addresses the question of information loss. We have proved that whenever information is lost from one quantum system, it remains in another system. In the quantum world information can never be lost. This can be applied to many contexts in Physics and has fundamental applications. This theory was experimentally tested in IISc, Bangalore, in the NMR lab of Prof. Anil Kumar. Considering the fundamental nature of these results, these two discoveries are very close to my heart.

What suggestions do you have for students like us in the field of science?

ARUN: Pursue science to know the inner truth of nature, not just to pass your exams or become a professional in some field. You may not be an extraordinary student, but you can still study science if you have the desire to do so and you have a creative mind.

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