

Scientist par excellence

PROFESSOR Ramanath Cowsik, an astro physicist of international repute and winner of this year's prestigious Padmashree award is a scientist par excellence. The padmashree is another feather in the cap of the world renowned authority on cosmology-particle physics and experimental physics. However, Professor Cowsik, has not forgotten his roots and is still the deeply compassionate human being, a great teacher, an astute institution builder and a person who continually inspires people.

Professor Cowsik, who has been heading the Bangalore based Indian Institute of Astrophysics (IIA) since 1992, recently spoke to **Deccan Herald** on a variety of issues including his scientific contribution, his concerns and aspirations for science education and research in the country.

"Awards are always welcome... these are instances that mark the time. I will be happy if the awards in any way find a positive influence on the students entering into science", he says welcoming the government's decision to award him with the Padmashree.

Professor Cowsik's scientific contributions encompass theoretical physics, experimental physics and science management. In theoretical physics, his work has been in cosmology-particle physics interface, astrophysics and cosmic rays. He showed that weakly interacting particles like neutrinos at a particular rest mass would dominate the gravitational dynamics of the universe, trigger the formation of galaxies and lead generically to halos of dark matter surrounding these systems. This has now become the basic paradigm for studies of structure formation and dark matter.

On the decline in the number students taking to pure sciences these days, he says "It is not a healthy sign. Science gives a universal perspective, a much more universal channel so that we can come together with the rest of the world."

Prof Cowsik, is himself a 'pure science' man throughout. He did his BSc from the University of Mysore in 1958. MSc in Physics from Karnatak University and Phd from the University of Mumbai in 1968. He has held various professional position in Tata Institute of Fundamental Research (TIFR) since 1961.

He points out that it is not the standard of the students who take

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in conversation with
eminent
astrophysicist and
Padmashree
awardee Professor
Ramanath Cowsik



Professor Ramanath Cowsik

to pure science and research that has declined but only the numbers. "There is no shortage of scientific institutions in the country and today a research associate is looked after well. The only thing needed is motivation to encourage and attract more students " he says.

"Sometimes, the senior scientists themselves are to blame. They need to be generous sharing their ideas with the students and encourage them. A leader in science is one who has appreciation of what others are doing", he adds. On the research front, Professor Cowsik's faith in Indian talent is immense. "We may be lacking in numbers, but not in quality", he says. His feels that science academies - Indian National Science Academy, Indian Academy of Sciences and the National Academy of Sciences - can play a major role in building up and also evaluating the academic standards in the universities.

"More money should be entrusted to the universities and

good research fellows should be encouraged. In fact, the three science academies can be entrusted with the job of maintaining quality and the time constant here can be around 10 years. Honest path leads to success. Some self sacrifice is required but there is a great future for India", he says.

Prof Cowsik's focus in astrophysics has been primarily on particle acceleration and transport as applied to the understanding of radiations from energetic sources such as quasars and supernova remnants. In the field of cosmic rays, he originated the leaky-box and the nested leaky-box models with exponential path length distributions, and these ideas are now standard in discussing cosmic ray spallation and propagation.

In experiment physics, Professor Cowsik conceived and fabricated a torsion balance of a new design; experiments performed with this balance place an upper bound on the strength of any new force of macroscopic range coupling to isospin of $\sim 10^{-5}$ of gravity per amu. This balance is currently being operated to test the Principle of Equivalence at the 10-14 level.

Most recently he explored the great and trans-Himalayan regions to establish a unique site for Optical and IR astronomy in Hanle, southeastern Ladakh, at an altitude of 15,200 feet. A 2-m telescope has been set up at this site which is operated remotely from the Centre for Research and Education in Science and Technology at Hosakote.

He has also made wide-ranging contributions to astrophysics through his studies of the radiation transport through accretion flows around black holes, particle acceleration in supernova remnants and their evolution as radio sources, origin of pulsar spins and proper motions and that of galaxies, just to name a few.

"There is a need for a long term vision on science. Dedicated scientists should be given an opportunity to carry on their research beyond the superannuation age of 60 years. This will go a long way in overcoming the present lacuna which we are facing in R&D. Scientists should also realise that society is doing them a favour. They should be obliged to the country and should come forward to shoulder the great responsibility", he says.