

News from ICTP 103 - Features - KR Sreenivasan

FEATURES

Katepalli R. Sreenivasan, a physicist who has earned an international reputation for his studies of statistical physics and turbulence, has been appointed director of ICTP. In a recent interview, Sreenivasan spoke about his hopes and plans for the institution that he is about to lead. Excerpts follow.

Katepalli R. Sreenivasan for Scientific Excellence

What prompted you to apply for and accept the position of ICTP director?

When I was about 12 or 13, my family priest taught me a prayer and said that I was to recite it 108 times a day: one hundred for myself and eight for the rest of humanity. If I did not find the time for 108 recitations, I should do 58, 50 for myself and eight for humanity. And if I couldn't do 58, I should do 33, 25 for myself and eight for humanity. The point is that no matter how much or how little one does for oneself, one should always contribute a constant amount for humanity. Coming to ICTP and furthering its causes may be my way of contributing to the rest of humanity.



What do you view as the ICTP's greatest strengths?

On the whole, the science done here is very good. In Italy, the scientific institutions in Rome, especially in physics and mathematics, are generally regarded as the nation's best. But, according to the opinions I have gathered, ICTP and the rest of the scientific institutions that comprise the Trieste System rank very high in quality. In the world at large, there are a few other institutions with visitor programmes similar to those found at the ICTP--for example the Institute of Theoretical Physics at Santa Barbara, and the Newton Institute at Cambridge, UK. Yet ICTP is unique in its mandate, which involves not merely serving the global scientific community but paying particular attention to the needs and concerns of scientists from the developing world. ICTP must attract and retain the best scientific talent that it possibly can and, at the same time, promote and support world-class science in the developing world. Excellence is at the heart of what the Centre does and that is what I intend to support during my tenure in Trieste. I should also emphasise that the centre's excellence is in no small measure due to the work of its dedicated staff.

What strengths do you bring to the job?

I think it would be better for others to make that judgement. In general, I think I pay close attention to details; I try to make decisions in a transparent way so that even those who don't agree with me can see how I arrived at that particular conclusion; I am inclusive, show commitment to my job and follow through. Since my appointment was announced, I've been encouraged by the large number of messages received from people affiliated with the Centre. Many have expressed their enthusiasm for the appointment. As a result, I begin my tenure with much good will that I hope I can capitalise on.



ICTP operates under a tripartite agreement between the Italian government, the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the International Atomic Energy Agency (IAEA). How do you view the relationship with each of these institutions?

ICTP's relationship with the Italian government and the Italian scientific community is very good. I have met a few government officials, including the Italian ambassador to UNESCO, Francesco Caruso, and they have expressed nothing but praise for the Centre's work. Their interest, I think, is driven by two overall concerns. First, they want to be proud of the Centre and its contributions to science, especially in the developing world. They want the Centre to do its job well. Second, I think that they would like ICTP to become better known among the Italian citizenry. That is something I intend to work on. The Italian government has been generous in its support to ICTP and it is quite reasonable for them to expect that the public knows as much as possible about the Centre. ICTP has good working relationships with

Trieste's other scientific organisations, often sharing their resources and expertise in ways that make the entire system stronger than any of its individual components. I support that. ICTP's relationship with IAEA is strong and I think the increased number of joint activities now taking place have added value and strength to this partnership. Yet IAEA understands the need for academic freedom within ICTP. As for UNESCO, there is enormous potential to tap in terms of the avenue it provides to its member states. I fully intend to capitalise on this advantage. Conversely, I think UNESCO can tap ICTP's scientific expertise to its advantage in a number of ways. There's a great deal of common ground worth exploring that, if cultivated properly, could serve the goals of both organisations well. In early discussions with UNESCO, we have agreed to work closely on several activities.

You intend to continue and hopefully expand your own research at the Centre. Could you explain the broad focus of your research and how you plan to pursue it in Trieste?

Broadly speaking, my area of research involves the understanding of a wide range of nonlinear and nonequilibrium problems, with a focus on turbulent flows. I was the founding chairman of the American Physical Society's Topical Group on Statistical and Nonlinear Physics. There are people at the ICTP and next door at the International School for Advanced Studies (SISSA) doing related research in these broad areas, and I see myself developing close ties with them. In Italy, there are people in Rome, in particular, but also in Milan and Padua, who have conducted worldclass research in these areas and I intend to interact with them. On an international level, I have worked in India, Australia, the United States, and a few other places, forging close collaboration with a broad range of people within my field. Here, too, I plan to maintain my contacts. As a result, my research at the Centre will not only be connected to ICTP but to scientific communities in Italy, Europe, and the rest of the world. This approach conforms to the spirit of international science, which is not confined to one neighbourhood but is welcomed in many places around the world.



What, specifically, has your research on turbulence entailed?

My research includes turbulence in the atmosphere, oceans, aerodynamics, blood vessels, and even home-heating systems. The major challenges facing those studying turbulence is to understand how properties vary as a control parameter is increased and to relate these aspects to the governing equations. This is the spirit of my work. One specific problem my colleagues and I have been working on recently is thermal convection: studies of the motion of fluid to better understand how thermal energy is transported from one part of a system to another—say, from the centre to the edge of the sun; or from the centre to the surface of the earth; or,

more simply, from the bottom to the top of a heated pot of water. Typically, the experiments consist of a container with fluid (helium at a few degrees Kelvin) that is heated on the bottom. The fluid on the bottom of the container expands and becomes lighter, causing it to rise to the top. Meanwhile, the fluid at the higher levels of the container, which is colder and denser, tends to sink to the bottom. This creates a continuous motion representing a form of turbulence. The description makes the process sound deceptively simple but it is not. For example, small changes in boundary conditions can lead to dramatic changes in behaviour that are far from easy to understand.



The challenges that ICTP faces today are vastly different from those the Centre faced at its inception. How should ICTP respond to these challenges?

If you read some of the speeches that ICTP's founding director, Abdus Salam, gave during the 1960s and 1970s, you come across passages praising the Soviet Union's scientific enterprise and suggesting that other nations, particularly developing nations, carefully examine those efforts for guidance in designing their own scientific enterprises. Salam, of course, was not the only person expressing this opinion. The same argument today would carry less weight. You simply cannot talk about science organisations in the same political and social context in which they were debated 30 or 40 years ago. Nevertheless, when ICTP was launched, the cold war was in full tilt and the Centre served as a forum where fruitful East-West exchanges took place. Now the scientific community faces challenges that sometimes have a similar slant: most notably, the inability of scientific communities to interact because of political and diplomatic circumstances beyond their control. For example, scientists working in universities and government research laboratories in the United States would like to interact with scientists from Iran at conferences and other events. But such interaction has proven difficult because of the severed diplomatic relations between the two nations. There is no reason why ICTP could not serve as a bridge between the scientific communities in these two nations in much the same way that it served as a bridge between the East and West during the cold war. ICTP's first and foremost functions must be to do and develop good physics, but in the process it can serve as a facilitator promoting mutual understanding among nations, especially those that are isolated from, and suspicious of, one another. ICTP, after all, is part of the larger world and it simply cannot ignore what divides and endangers humanity. On another front, when ICTP was created some 40 years ago, the state of science throughout the developing world was not advanced. Today the situation is different. Some countries, like South Korea, have done very well. China and India, for example, have a few scientific institutions that rank among the best in the world. Yet, the quality of basic science in these same countries is still far from uniform, and has actually declined in some instances. Some

other countries have done worse. As a result, today, there is no single strategy for promoting science in the South, and ICTP has to devise different innovative policies for different countries. Whether we should target some countries and work more diligently with them may be something to consider. I am not sure this is the best way to proceed but it is unrealistic to think that one can elevate every country to a high level of scientific excellence in a short time. We must understand the needs of different countries and devise different strategies. If history is any guide, the Centre can make a tremendous difference, and I look forward to being part of this effort.

[Back to Contents](#)  [\(index.html \)](#)  *[Forward to Features](#)* [\(features_Magnasco.html \)](#)

[Home](http://www.ictp.it/) [\(http://www.ictp.it/ \)](http://www.ictp.it/)