Challenging Einstein on time

On June 12, mathematician, scientist, polymath, physicist and educator **CK Raju** will receive 2010's Telesio-Galilei Academy Award in Hungary, acknowledging a controversial correction he made to Einstein's *Theory of Relativity* that questions physics' very foundations. He chats with **Shana Maria Verghis** about being anti-authoritarian, about a Royal Society president using his ideas without crediting him. He also describes the 'colonisation of the scientific Indian mind', which values validation by foreign bodies and even seems to view research in Indian science journals as inferior

Professor Chandra Kant 'CK' Raju seems to have made a lifetime of taking on authority in his quest for truth and getting away with it. Albeit, not without battlescars, to which we will come later. About six foot something, with a burly, glowing aura that demands attention, his booming bass muffled the crowd noises in the coffee shop. We were chatting about a gold medal he will receive in Hungary from his peers, for 'taking the piss out of Einstein's *Theory of Special Relativity.* Not words you will see on his citation. It is, in civilised parlance, for his correcting a mistake the genius had made.

One this brilliant man,whose area of expertise is time, says, came about, "from Einstein's limitations as a mathematician". And it's a correction he asserts might already "be changing the base of physics." Put simply, it's like this.

The *Theory of Relativity,* as you know, is in two parts. Special relativity and general relativity. The first relates to 'the structure of spacetime'. The second, 'to gravitation'. Max Planck declared Einstein as its originator. But others were working on relativity too, including French mathematician, Henry Poincare, who was sidelined for 'waffling' in a field that demands determinism. Raju came across Poincare's findings and those of Lorentz, while writing "for the pedagogical level, not for research." He was reading ET Whittaker book (1953) where Chapter 2 was *The Relativity of Poincare and Lorentz.* He found no waffling. Poincare's definition of relativity clearly anticipated $E=MC^2$, as he wrote of, *an entirely new mechanics, which would be, above all, characterised by this fact, that no velocity could surpass that of light, any more than any temperature can fall below absolute zero.* Both Poincare and Whittaker wrote about relativity in 1904, but Einstein said he didn't read them. Was his genius borrowed, wondered Raju, whose own work someone would 'borrow'.

In his book *The Eleven Pictures of Time,* Raju maintained relativity theory's origins were hidden. There was a credit issue. He also explored if 'time-beliefs', matched time in relativity. The 'mistake' Raju speaks of pertains to instantaneity and history dependence vis-a-vis-time. He says Einstein errored on instantaneity, which is time-symmetric, because "physics is defined by its mathematical equations, not by interpretations we assign these questions." He also adds that history dependence is time assymetric. So what does all this mean?

In the context of instantaneity, he explains, "The present state of a system evolving under instantaneity, symmetrically decides both past and future." But when there is history dependence, "The past decides the future, but the other way is impossible as systems with distinct histories may end in the same future state." So "knowledge of the present state, does not enable a unique reconstruction of past history of the system."

This flies against a 'causal' description of the world, where cause and effect relate. With Raju's postulation, "the state of the world at any time is decided by its state at any one time". This allows spontaneity and anticipation. So, he says, "If an arrow is flying through air, one can say 'the arrow is flying

now because it will fall to the ground' in the next moment." Raju's approach moves from Newtonian, mechanistic physics, using mixed functional differential equations and "takes creativity into consideration."

At the heart of his story, is a man's attempt to challenge accepted wisdom and bust myths, purely from the point of view of scientific enquiry, which encourages seekers to question everything. Even giants, to rephrase the words of Sir Isaac Newton, on whose shoulders we stand.

Raju explains his penchant for ramming horns with authorities like the great Einstein in this case, telling us he once antagonised a physics school teacher over a wrong explanation, for which his grades were hit. "I'm not defying for the sake of it. But if I see something is wrong, I can't keep quiet, or I'll be composite in the act." The schoolboy incident still rankles with this son of academics.

Later, "Me and my big mouth", he said, got flack at Mumbai IIT interview, though insolence and a high score won a seat. His first paper opposed an idea by another Indian titan, Jayant Narlikar. He has faced off with heavyweights like late, eminent nuclear physicist Raja Ramana. Today he is, "Willing to take on critics through public debate." He grins, "Most dodge me." He suggests a reason maybe, "Prominent scientists are often not researching, so they lose touch, perched on their fancy chairs."

Quantum Computing, Next Big Thing

Raju travels wide, teaches, researches and has written several books. He lives 'comfortably', from work in computer science. He remarks the problem with a sacred cow like relativity, is that "few people understand it. Instead they tend to learn it by rote." So, "I've first tried to explain it, before presenting my correction." He says the other problem was painting Einstein as flawed. "People have an emotional connection, and find it hard to see his authority diminished."

The background of his research is a paper dating to 1992 in the Pune-based *Physics Education* journal. Seventh in a series of 10 with the theme, *On Time.* They later appeared in his book *Time: Towards A Consistent Theory* (1994, Kluwer Academic, Dordrecht). The gist was a claim that using Mixed Functional Differential Equations, could 'lead to a paradigm shift in physics,' from Newton's ordinary functional equations. Among his critics was one HD Zeh in 1999 at a meet in Groningen, Germany, who later published Raju's ideas in his journal. In 2005, Sir Michael Francis Atiyah, President of Britain's Royal Society, announced the same idea as 'Atiyah's Hypothesis,' at an Einstein lecture in October 21, 2005, given in the University of Nebraska-Lincoln and Kavli Institute of Theoretical Physics.

But the year before, in 2004, Raju had established links between FDEs and quantum mechanics 'as a theorem'. He asserts it 'existed naturally.' And postulating a 'hypothesis' signified conjecture, which created complications in physics, as one could never firmly reach conclusions. Raju says Atiyah was aware of his research and had communicated with him on this score. In 2006, one M Walker acknowledged this true. But only in 2007 was Raju's work acknowledged.

The positive factor from this was, "I got much needed validation. It would have been tougher, because I wasn't anyone of importance." However, Atiyah's 'hypothesis' is still in circulation. And the mistake pointed out to the *Notices of the AMS* haven't been published. Meanwhile, he boasts of developing a technique to "learn calculus in five days, for dropouts. It is a subject that is often taught poorly, so maths scares people off, especially the more sensitive ones." He has been invited to take his calculus course to a University in Malaysia. He did trials in Sarnath.

Raju now wants to have his *Theory of Special Relativity* version in Indian college texts, but says, "I'll need to write a book first. I will do that after retirement." What irks him is research like his, in Indian scientific journals is often rubbished, "unless it gets validated internationally." He went on, "Experts we need. But what happens is one compromises to enter the club. And they're in the West, getting a monopoly over scientific knowledge. They're also allowed privileged access to private research from countries like ours." The analogy he used was that of "a peasant giving his virgin wife to the landlord, before bedding her."

He shares, "You are usually giving papers in confidence to some eminent person. It can be abused." The system we have, he went on, "can't catch up. Eminent senior scientists are also conditioned to look West."

Talking about practical uses of his research, he says the next big thing is quantum computing. "There's lots of money there. I want India to benefit. Bioinfomatics is big too. Germany is working on this. Earlier, people said, "Hardware from India? Never. But they created a critical mass."

photo: Sahil Kathpal