

The Shimura–Taniyama–Weil conjecture is proved

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The well known 'Fermat's last theorem', whose enunciation goes back to mid-seventeenth century, was finally proved by Andrew Wiles in 1994. The theorem asserts that the equation $x^n + y^n = z^n$ has no solutions in integers x, y, z with $xyz \neq 0$ and n an integer greater than 2. Wiles deduced the result by proving, partly in collaboration with Richard Taylor, a part of the celebrated Shimura–Taniyama–Weil conjecture: It

was proved that all *semistable* elliptic curves over \mathcal{Q} are modular; it had been established earlier through the combined efforts of G. Frey, K. Ribet and J.-P. Serre that this would imply Fermat's last theorem.

Recently, towards the end of June 1999, four mathematicians, Christophe Breuil of France, and Brian Conrad, Fred Diamond and Richard Taylor of USA, have announced proving the Shimura–Taniyama–

Weil conjecture, *in full generality*, asserting the modularity of all elliptic curves over \mathcal{Q} . The work, which builds on the fundamental ideas of Wiles, marks another major stride in the so-called 'Langlands programme', which is one of the central themes of number theory.

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OPINION

The Kumbha melas of science: Time to kill (them)

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Two traditions with different faiths

Tradition 1. Once every 12 years, a few million people with an unshakable faith in what they practice, converge at a predetermined place along the banks of river Ganga to share, exchange, discuss, indulge in serious discourses and to bathe in the spiritual ecstasy; they also take bath in waters of Ganga with belief that it cures their sins. The gathering is called Kumbha Mela. These people are dubbed to be blindly religious and hence by derivation their act is considered nonscientific. In the minds of a significant proportion of scientists they are even irrational. I am one of those irrational persons as I did attend the Kumbha mela during 1998.

Tradition 2. Once every six years a few thousand botanists with a self pride in their profession, converge religiously at a predetermined place in any one of the ably hospitable countries, to share, exchange, discuss, indulge in serious discourses and to heave a great sigh of scientific ecstasy; they do often visit the nearby forests in which they trek and the rivers in which they swim and bathe. This gathering is called International Botanical Congress (IBC). The participants are respectfully called the scientists and hence by derivation are

considered to be rational. I can claim myself to be one of this respected lot because I attended the IBC held at St. Louis, Missouri, during August 1999.

My choice of IBC in this article is only for convenience and not specifically aimed at. There are a number of such congresses of science and it is just that IBC, held recently at St. Louis, Missouri, happened to be one such significant large scientific gathering that I attended immediately following my visit to Kumbha mela at Haridwar last year and so I can relate to it better (Note 1). In fact the experiences at IBC are more a rule than an exception for the way in which several scientific meetings are held.

Clearly both Kumbha mela and the scientific gatherings are being traditionally followed though the practitioners have different faiths of their own. But for the fact that not many delegates of the Kumbha mela can appreciate the proceedings of the scientific gatherings, as much as, not many deities of a scientific gatherings can appreciate the justification of Kumbha mela, the two have a lot of parallels and a vast set of practices in common (See Table 1).

Congresses for what purpose?

My purpose of pitting these two disparate events and claiming an apparently

ridiculous analogy is not merely to bring up a pedantic comparison between them. Having attended perhaps one of the most well organized and highly attended (an estimated over 4000 delegates) international congresses, I began contemplating the extent to which these large gatherings meet the very purpose for which they are held. I could not help comparing my frustration during the congress with what I experienced while passing through the Kumbha mela last year. I found the traditional or religious fervor reigns equally strongly in both the activities – the Kumbha mela and the scientific gatherings.

Amidst an 'orderly' chaos

One of the major purposes claimed for these gatherings is that the scientists use this as an occasion to meet and vigorously interact with other colleagues whom they can otherwise hardly meet. Unfortunately this is seldom achieved to the extent one wished and in proportion to the investment one makes, thanks to the growing size of these conferences. The problem lies not in the organization but probably in an inevitable feature of such large gatherings. It is said that certain amount of order inevitably emerges in a large set of chaotic ensembles. I also believe in the converse