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**Ken Ono\*** (ono@math.wisc.edu), Department of Mathematics, University of Wisconsin, Madison, WI 53706. *Unearthing the visions of a master: The web of Ramanujan's mock theta functions.*

In his last letter to Hardy, dated January 20, 1920, Ramanujan defined 17 peculiar functions which he referred to *mock theta functions*. Although these mysterious functions have been investigated by many mathematicians, their most basic properties eluded discovery until 2002.

At the 1987 Ramanujan Centenary Conference at the University of Illinois, Freeman Dyson proclaimed:

*“Mock theta-functions give us tantalizing hints of a grand synthesis still to be discovered. Somehow it should be possible to build them into a coherent group- theoretical structure... This remains a challenge for the future. My dream is that I will live to see the day when our young physicists, struggling to bring the predictions of superstring theory into correspondence with the facts of nature, will be led to enlarge their analytic machinery to include not only theta-functions but mock theta-functions.”*

Here we describe the solution to Dyson's "challenge for the future", the theory of harmonic Maass forms. These automorphic forms have quickly found many applications: Complex multiplication in Number Theory, Donaldson invariants, Gross-Zagier formulae, Partitions, to name a few. We shall give an indication of some of these applications. (Received September 02, 2008)