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A PERSONAL ACCOUNT OF PROFESSOR ABDUS SALAM

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1. Preamble

Professor Abdus Salam makes a great copy for a biography. He was born into a relatively poor family but made good in incredible ways; he was from a poor Asian country with no strong traditions of doing modern science but broke through those barriers by doing great physics and attaining the pinnacle of glory in the Western world; he was the conscience of good science in all developing countries; he felt deeply for the lost glory of the Islamic world and agonized over it with untold burden; he created such fine institutions as ICTP and TWAS and provided them with inspiring leadership; he was admired by scientists all over the world. He was extraordinarily colorful as a scientist and a human being and an intellectual of the first order. He lived like a prince and died in agony. In short, he was many wonderful things — all in one lifetime.

Yet, controversy did not escape Salam in his own lifetime and later; his vision could be grand but details sloppy; he was at ease with generals as much as he was with Nobel Laureates; he was at once humble and vain; even as he cajoled his country into getting better in science, he was hindered at the official level from achieving his powerful desire to become the Director-General of UNESCO; he felt the compelling need to proclaim his religiosity even as he was formally banned from the fold; he was accused of taking ambiguous stand on atomic weapons; and so forth.

It is thus not a surprise that there is an increasing interest in Salam's rich and varied life and accomplishments. The troubled times of today are especially appropriate for taking this interest because here was a person who professed unabashedly to drawing inspiration from Koran but demonstrated without an iota of doubt that this connection did not interfere with his scientific prowess — indeed, in his mind, his religious outlook added to the richness of his science. Here was a person who

succeeded more than once, in more ways than one, and against many odds.

Several people have thus recently expressed interest in writing about Salam or making documentaries of his life. This renewed interest has led to requests from potential authors, both secular and religious, for access to Salam's files and to people who knew him well. I have made the catalogued material readily available to all as a matter of principle, but must admit to a misgiving towards opening his personal files to anyone. My one principal reason is that very few people have demonstrated the depth of perception to view Salam's complex personality sympathetically and in totality, without depriving the posterity of the contradictions of his life and without defying him, and yet to draw critical lessons from it. My belief is that Salam, who was clearly aware of his special status, would have wanted nothing less. There is no progress otherwise.

An authoritative biographical memoir of Salam is thus overdue. Salam is one of my heroes and I am pleased to write about him for these Proceedings, but this article is not even remotely at the level that is needed. While sitting in what used to be once his office, I cannot help thinking the thoughts that he must have entertained, the kinds of ambiguities he willingly embraced — without, however, sacrificing clarity in his own personal science. His task must have required a great deal of tact, optimism, sympathy, understanding, opportunism, high-level persuasions and low-level browbeating — and endless frustrations. That he excelled in this self-appointed role is for me a matter of great admiration and pride in the totality of Salam.

In the following sections, I shall briefly attempt to record my impressions of Salam. The part of the text is somewhat reworked from an article prepared for the commemoration of the 10th anniversary of Professor Salam's death.

2. Abdus Salam in His Own Words

It is best to let Salam speak in his own words on how he evolved into a great physicist from modest beginnings. I reproduce below a brief article that was culled a few years ago from some of Salam's writings.[1] The article also speaks directly to his vivacious and engaging personality.

> "I was born in the country town of Jhang, then part of British India, now Pakistan, in 1926. My father was a teacher and educational official in the Department of Education and my mother was a housewife. I had six brothers and one sister. My family was by no means rich. My father took a vast amount of interest in my school work. He had great ambitions for me. I was destined for the Indian Civil Service, entry to which was by competitive examination. However, this was not to be — as events in my life took a different turn.
>
> When I was at school in about 1936 I remember the teacher giving us a lecture on the basic forces in Nature. He began with gravity. Of course we had all heard of gravity. Then he went on to say "Electricity. Now there is

a force called electricity, but it doesn't live in our town Jhang, it lives in the capital town of Lahore, 100 miles to the east". He had just heard of the nuclear force and said "that only exists in Europe". This is to demonstrate what it was like to be taught in a developing country.

When I was 14, I won a scholarship to Government College, Lahore, with the highest marks ever recorded. I recall that when I cycled home from Lahore, the whole town turned out to welcome me. I wrote my first research paper when I was about sixteen years of age. It was published in a mathematics journal but I wasn't actually hooked on research till I went to Cambridge University.

I was very fortunate to get a scholarship to go to Cambridge. The famous Indian Civil Service examinations had been suspended because of the war and there was a fund of money that had been collected by the Prime Minister of Punjab. This money had been intended for use during the war, but there was some of it left unused and five scholarships were created for study abroad. It was 1946 and I managed to get a place in one of the boats that were full with British families who were leaving before Indian Independence. If I had not gone that year, I wouldn't have been able to go to Cambridge; in the following year there was the partition between India and Pakistan and the scholarships simply disappeared.

At Cambridge, I achieved a First in the Mathematics Tripos in two years. I still had a third year free in the sense that I had the scholarship and the choice of whether to go on with higher mathematics — that's part III of the mathematics tripos — or to do the physics tripos. On the advice of my tutor, Fred Hoyle, who said "If you want to become a physicist, even a theoretical physicist, you must do the experimental course at the Cavendish. Otherwise, you will never be able to look an experimental physicist in the eye". I joined the Cavendish Laboratory where Rutherford had carried out his experiments on the structure of the atom. The Cavendish was an outstanding laboratory for experimental work and a focus for physicists around the world. However, I had very little patience with experimental equipment. To be a good experimenter you must have patience towards things which are not always in your control. I think a theoretician has got to be patient too, but that is with something of his own creation, his own constructs, his own stupidities.

The very first experiment I was asked to do was to measure the difference in wavelength of the two sodium D lines, the most prominent lines in the sodium spectrum. I reckoned that if I drew a straight line on the graph paper then its intercept would give me the required quantity I wanted to measure. Mathematically, a straight line is defined by two points and if you take one other reading then mathematically that should be enough since you then have three points on that line, two to define the straight line and the third one to confirm it. I spent three days in setting up that equipment.

After that I took three readings and took them to be marked. In those days the marking of experimental work in the class counted towards your final examination. Sir Denys Wilkinson was one of the men who supervised our experimental work, and I took it to him. He looked at my straight line, and asked "What's your background?" I said "Mathematics". He said "Ah, I thought so. You realise that instead of three readings you should have taken one thousand readings and drawn a straight line through them". I had by that time dismantled my stuff and didn't want to go back. So I tried very hard to avoid Denys Wilkinson during the rest of the year. I still remember when the results came out in 1949. I was looking at the results sheets hung in the Cavendish and Wilkinson came up behind me. He looked at me and said "What sort of class have you got?" and I very modestly said "Well, I've got a first class". He turned full circle on his heel, three hundred and sixty degrees, turned completely round, and said "Shows you how wrong you can be about people".

I went back to Lahore in 1951 and taught there at the University. But as a physicist, I was completely isolated. It was very difficult to get the journals and keep in touch with my subject. I had to leave my country to remain a physicist. Now, it is the lack of this contact with others that is the biggest curse of being a scientist in a developing country. You simply do not have the funds, the opportunities, which those from richer countries enjoy as a matter of course. There are not the communities of people thinking and working in the same fields. This is what we have tried to cure by bringing people together at the International Centre for Theoretical Physics which I founded in Trieste in 1964. The Centre provides the possibility for scientists to remain in their own country for the bulk of the time, but come to the Centre to carry out research for three months or so. They meet people working in the same subject, learn new ideas and can return to their own country charged with a mission to change the image of science and technology in their own country.

I returned to Cambridge in 1954 as a lecturer and Fellow of St. John's College. Three years later, I accepted a professorship at Imperial College, London, where I succeeded in establishing one of the best theoretical physics groups in the world.

The pinnacle of my physics career came in 1979 when I shared the Nobel Physics Prize with Sheldon Glashow and Steven Weinberg for our unification of electromagnetism and the weak nuclear force in the "electroweak" (a word which I invented in 1978) theory, one of the major achievements of twentieth-century physics. This theory had made predictions that could be verified by experiment. The most revealing of these was that a new particle exists at extreme energies. To test this theory we had to convince the experimental physicists working on the great particle accelerators to build new equipment: To create, in principle, conditions that would be similar

> to those first few moments in the birth of the universe. In 1983 the final confirmation was obtained with the discovery that the predicted particles — the intermediate vector bosons — did exist. Called W^+, W^- and Z^0, these hypothetical particles were seen for a few fleeting moments under the cosmic conditions of the CERN accelerator. This temporary existence was enough to demonstrate that the unification theory was an accurate description of the fundamental nature of matter. This experimental verification led to the award of the Nobel Prize to Carlo Rubbia and Simon van der Meer in 1984."

I might add the following postscript: Salam held his professorial position at the Imperial College from 1957 until 1993 with distinction. From 1964 until 1993, he was concurrently the Director of the International Centre for Theoretical Physics (ICTP), where he provided both the physical drive and the lofty vision. For a period of time, he played various advisory roles for the government of Pakistan, and acted as a spokesperson for science in developing countries, especially Islamic countries. Salam fell prey, around 1985, to a neural disorder known as Progressive Supranuclear Palsy, involving the death of selected neurons in the brain. Yet, he exerted himself greatly to carry on his responsibilities for several more years at ICTP (and also TWAS). Those who knew him remember them as his difficult years. He passed away at his home in Oxford on 21 November 1996.

3. Brief Remarks on Salam's Physics

Salam's place in physics is described in several places,[2] but it is useful to understand it in his own words. In an undated popular talk given sometime after 1979, he described his work as a major milestone in the quest for unification of forces of nature. He first described Newton's role in the unification of celestial and terrestrial gravitation — an idea that is now commonplace, but undoubtedly revolutionary at the time. Then Einstein's theory of relativity defined gravitation through the curvature of the space-time manifold. Space and time were never again to be considered in separate terms.

On another branch of unification, Faraday realized that electricity and magnetism were two aspects of the same physical phenomenon, and Maxwell wrote down his beautiful equations describing the theory of electromagnetic radiation.

The next set of forces deals with nuclear structure. The weak force is the second weakest after gravity, responsible for radioactive decay and neutrino interactions. Enrico Fermi understood the basics of weak interactions while studying the decay of radiation. The weak force occurs in the decay of nuclear particles requiring, as learnt later, a change of a quark of one flavor to another. The theory that describes the unified electromagnetic and weak interactions is the Standard Electroweak theory, which, in large part, is the work of Sheldon Glashow, Abdus Salam himself and Steven Weinberg, for which they shared the 1979 Nobel Prize.

The strong force is short-ranged, acting over ranges of order 10^{-13} cm and is responsible for holding together the nuclei of atoms. It is important for both nuclear fission and fusion. Despite existing gaps, there is strong evidence to suggest that a theory that unifies strong forces with electroweak forces is required to make sense of the Universe. This is no place for a historical survey of developments in this quest (nor am I qualified for the task), but it suffices to say that, along with Jogesh Pati (one of ICTP's Dirac Medalists), Salam played an important role in the development of this part of physics as well (see the collection of papers in Ref. 2).

The quest for unifying all forces including gravity has been the focus of attention in high-energy physics. It is not surprising that Salam took interest in unifying gravitational field, and again I refer to Ref. 2 for some of his papers with his long-time collaborator, John Strathdee. This type of inquiry has matured in diverse directions under the common name of string theory and its several manifestations.[3] The field has come under attack recently for not having yet produced tangible physical results[4] but there is little doubt that it has been a very stimulating construct that may ultimately begin to answer important physics questions.

Within this grand construct Salam placed himself in an important position — and rightly so. He had several abiding technical interests such as renormalizability, non-Abelian gauge theories and chirality. The importance of the Standard Model, which he helped shape, was realized more completely when Gerard t'Hooft proved its renormalizability in 1972 and the experimental confirmation came about in 1983 at CERN.

Physics has moved on. The recent major experimental developments in cosmology have introduced remarkable changes in the outlook of the Standard Model of quarks and lepton, and have deeply modified the views prevailing at the time of Abdus Salam. Even a normally conservative person today would say that we are witnessing a turning point. Recent experimental findings, which have led to the 2006 Nobel Prize to John Mather and George Smoot for their discovery of the black-body form and anisotropy of the cosmic microwave background radiation, have introduced an entirely new view of the constituents of the universe. It appears that the overwhelming majority of our scientific and technological knowledge has been confined so far to about 5% of the universe related to ordinary matter — both inanimate and living.[5] Determining the nature of the missing 95% of the Universe is amongst the most important problems in modern cosmology and particle physics — something that was unforeseen in Salam's time.

Changes in physics have come from another direction as well. Conviction is growing that reductionism, the cornerstone of much of 20th-century physics, has serious limitations of principle despite its enormous successes; that a deductive link does not exist between the finest constituents of matter and phenomena that occur on the human scale; that one needs an equally deep understanding of the so-called emergent phenomena regulated by higher organizing principles; that these

organizing principles are equally deep in both content and structure. Perhaps it is too much to say that physics at the turn of the 21st century is undergoing a crisis similar to that at the turn of the last, but there is no doubt that the subject is changing its landscape.[6]

4. Salam's Concern for Science in Developing Countries

There is a second aspect of Salam's work that merits equal attention: his concern for scientists from poor countries — or developing countries as they are euphemistically called today. Towards the end of one of his lectures,[7] Salam remarked as follows:

> "Unquestionably, there has been no one like Einstein in physics of this century, but one has to reflect on how easily Einstein might have been lost, particularly if he had been born in a developing country ....
>
> Would an Einstein — with his total commitment to science for its own sake — fare well in the climate of today, even in a developed country, [in an environment that looks constantly for] social relevance, immediate applicability and cost-benefit analysis in supporting scientific research ...."

One of Salam's passions was that the best and the brightest in developing countries do not get lost because of lack of opportunities. Continuing from his description,[1] we have the following text:

> "I spoke earlier of the difficulties of doing science in developing countries. I would like to conclude with an appeal. Funds allotted for science in developing countries are small, and the scientific communities sub-critical. Developing countries must realize that the scientific men and women are a precious asset. They must be given opportunities, responsibilities for the scientific and technological developments in their countries. Quite often, the small numbers that exist are underutilized. The goal must be to increase their numbers because a world divided between the haves and have-nots in science and technology cannot endure in equilibrium. It is our duty to redress this inequity."

It was this passion that was instrumental in establishing ICTP as a center of learning where such opportunities might be provided for scientists from developing countries. Salam's specialization in high energy physics meant that the Centre was oriented initially towards that area of physics, but he never lost track of other branches of theoretical physics. The Centre had diversified in his own time as is evidenced by the following quote:[8]

> "The Centre has now existed for 18 years. It works on the interface of pure and applied physics and deals with subjects like the physics of energy, physics of materials, earth and environment, physics of microprocessors besides pure physics, the physics of energy, physics of fusion, physics of

> reactors, physics of solar and non-conventional energy sources, biophysics, laser physics, microprocessor physics, communication physics, physics of the earth, oceans and deserts, and applicable mathematics, besides disciplines of pure physics like particle physics, astrophysics and relativity."

In keeping it with his own vision,[9] the Centre now does encompass several of these branches of physics and also mathematics. It is a lively place where ideas cutting across different branches of physical and mathematical sciences coexist, and has grown well past the confines of theoretical physics as it is generally understood. It is a hallmark of international cooperation in science working under a tripartite agreement among the United Nations Educational, Scientific and Cultural Organization (UNECO), the International Atomic Energy Agency (IAEA) and the Government of Italy (which funds a major share of ICTP).

Salam was well aware that physics is incomplete without an experimental component, and took interest in the experimental work of young scientists. In particular, one finds the following comments in a report that he prepared for the *ad hoc* committee evaluating ICTP in 1983:

> "There is a pressing request from experimental physicists coming to the Centre to find here at least some of the experimental facilities which are not available in their home countries. Two kinds of laboratories have been therefore proposed ... (a) Training and Demonstration Laboratories ... in which scientists could spend a training period ... and (b) Permanent Research Laboratories ... where high-level, modern research can be performed ...."

Thus, beginning around 1980, there has always been some experimental work at ICTP underlying Salam's belief that physics is the result of a fruitful interplay between experiment and theory (one has to include computer simulations these days). This has resulted in the creation of both types of labs mentioned above, and have included, at one time or another, microprocessors, aeronomy, distributed instrumentation networks, information and communication technology, optics and lasers, fluid dynamics, synchrotron radiation, high-T_c superconductors, materials science, accelerator physics, and so forth. Much of the experimental work has been done in cooperation with other local institutions in Trieste such as International Centre for Science and Technology, International Centre for Genetic Engineering and Biotechnology, the Synchrotron Laboratory Elettra, and Italian Institute for Nuclear Physics (INFN), and other institutions in Italy and elsewhere (such as the International Centre for Scientific Culture — World Laboratory in Geneva), as well as CERN. The best example of the interaction between theory and experiment is Salam's theoretical predictions and the experimental discovery at CERN, which led to the Nobel Prize for Carlo Rubbia and Simon van der Meer in 1984.

5. Salam's Broader Concerns

It is sometimes said that every great man has had at least one great idea. Salam may be said to have had two: the electroweak theory and the ICTP. As a physicist and as a human being concerned about poor countries and with scientists from there, Salam was simply admirable. He is one of my heroes, and I am honored to hold a professorship in his name.

As I said in the Preamble, Salam was a person with diverse ideas and drives. He was not content in trying out one single thing. I am therefore particularly unsympathetic to efforts that attempt to fit him into shapeless putty and forget the rich tapestry that made him the unique person that he was. In this spirit, I should point out at least one dimension of Salam to which I myself cannot relate — as indeed several others in his time could not. I have no special point to make here except to convey my bewilderment by the trouble it caused him. This dimension concerns his pronouncements on a wide range of subjects, such as the history of science across cultures and ages, and the grating admonitions of the rich and powerful. There was often more rhetoric than substance in these deliveries, and generalizations more sweeping than to which he was entitled on the strength of cursory sources that seemed to have been consulted.

It is even more difficult to appreciate his latter-day preoccupation with Islam, his penchant to proclaim religiosity, and the drive to proclaim that he was a believer and a practicing Muslim — sometimes attempting to establish that he was better at it than others. These extraordinary circumstances, probably in part the result of the religious persecution that he indirectly and directly faced, did not prevent him from being excommunicated eventually: I have in possession a letter in which he remarks on this fate with extraordinary sadness. It was also clear that he met insurmountable hurdles from the officialdom of his country when he made concerted efforts to become the Director-General of UNESCO. That his health deteriorated soon after this failed attempt is perhaps no coincidence, though it is hard to prove the connection. That no one in the Pakistani power structure at the time felt free to attend his burial, and that his remains lie buried in a grave of no consequence, are sad facts that one cannot but reflect upon glumly. I have been told that Salam was never allowed to make his Hajj[10] and that, in an incongruous and meaningless attempt to exclude him from Islam even in his death, the words on his grave "there lies the first Muslim Nobel laureate" have apparently been altered[11] to "there lies the first Nobel laureate".

Somewhere in the kind of end that befell a great and passionate man lurks a lesson. Perhaps religion and science cannot be mixed indiscriminately, though one can live them simultaneously and successfully in one's life without making a hard sell of either. If Salam's message was that science does not negate spiritual outlook, it is indeed a valuable point to drive home — especially in our era in which considerable concern exists that scientific outlook is somehow a negation of spirituality. If

his thesis was that religion is not blind faith, it underscores an eternal view. But the coexistence of science and religion can be imbued only through example that sanctions no aberrant proclamations. One of the most profound statements I know is that it is hard to tell apart, through causal encounters, a deeply spiritual person from one who is not.

6. Final Remarks

One of Salam's well known quotes, adopted as one of ICTP's driving mottos, is that "scientific thought is the common heritage of mankind". In the scientific legacy of our species, many countries and cultures have indeed made crucial contributions — some, no doubt, more than the others. This subject is worthy of deep study and cannot be reduced to clichés. Salam's core concern was that science had become the province of the West in recent three or so centuries, and that the situation needed to be brought back to normalcy (that is, a situation in which all cultures contributed to science) if the world as a whole were to share its benefits. He particularly bemoaned the fact that science in Islamic countries had fallen on hard times, and, both privately and publicly, cajoled Muslim scientists to change the situation in all possible forms. Unfortunately, his considerations on this score remain valid, by and large, even today.[12]

One should, however, not forget the reasons why the West has been able to gain the ascendancy in science and technology. The West is not innocent in how it has appropriated a good part of the world's wealth and resources; indeed, there is no doubt that this propensity has played a major role in its recent rise to power and plenty. Insofar as it concerns science, however, this pre-eminence lies in its ready acceptance of factual evidence, wherever it may have come from and wherever it may lead to; the courage to make risky hypotheses but the willingness and discipline to subject them to the rigor of experimental verification; a strong focus that does not permit solace to be found in subjective experiences or in the authority of a text. It is not as if the West of yesteryears, or of today for that matter, is flawless in its pursuit of truth — one only has to recall the fate that befell Galileo and the modern-day rise of creationism. Even so, the underlying qualities remain as stated in so far as it concerns the best science that we have inherited. It is the willingness — indeed eagerness — to challenge and be challenged that allows us humans to build the basis for comprehending the universe and our place, if of any consequence, in it.

If the rest of the world catches up on these traits, Salam's dream in its best sense will have come true. The institution that he created, namely the ICTP, and those of us who have followed his footsteps and tried to fill his large shoes, will be proud to be part of his dream.[13]

References and Endnotes

1. From "One hundred reasons to be a scientist," published by the Abdus Salam International Centre for Theoretical Physics, Trieste, Italy. A copy of this book for a nominal cost, as well as items 10 and 11, can be obtained by writing to ICTP library at library@ictp.it.
2. See, e.g., *Selected Papers of Abdus Salam*, edited by A. Ali, S. Isham, T. Kibble and Riazuddin (World Scientific, 1994).
3. There are now several popular books on string theory, and I cite just one example. B. R. Greene, *The Elegant Universe*: *Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory* (W. W. Norton, New York, 1999).
4. See, e.g., P. Woit, *Not Even Wrong*: *The Failure of String Theory and the Search for Unity in Physical Law* (Basic Books, New York, 2006).
5. I am not aware of a comprehensive account from which to gain a full perspective of the subject. Popular accounts can be found in science magazines such as *Scientific American*. The article by R. R Caldwell, "Dark energy," published in *Physics World*, in the May 2004 issue, is one such.
6. Even though the idea of emergence is no longer new, it is frustrating that one cannot recommend a concise source for gaining a decent understanding of the subject without succumbing to hyperbole and mushiness. Perhaps the article by P. W. Anderson, "More is different: Broken symmetry and the nature of the hierarchical structure of science", published in *Science*, 177, 393–396 (1972), may still be regarded as a good account of the main points.
7. Speech given at UNESCO by A. Salam on 9 May 1979, commemorating the 100th Anniversary of Albert Einstein.
8. Address given by A. Salam in Belgrade, 13–17 December 1982, in a meeting on the establishment of ICGEB.
9. Salam's vision was actually different in detail. He had envisioned establishing separate institutes on each of these aspects of science, at least some of them in developing countries, all of them federated in some fashion with ICTP. In 1969, in Nobel Symposium 14, Stockholm, 15–20 September 1969, he delivered a talk under the title "The advancement of science for the developing countries". In part, he said there as follows: "... Such Institutes, together with the International Institutes I have spoken about in the developing countries — both in pure and applied sciences — as well as in Economics, Sociology and other studies of man — would make up a Federation, enriching each other by contacts, deriving strength from common ideals shared and practised. As I said I would like to see such a Federation linked up with the United Nations Organization or one of its Agencies in a loose connection. ... Before this Federation of World Institutes begins to look like the World University ... new Institutes ... will have to be created to link up with this Federation. But the first step — the Federation — could perhaps come even within the next ten years." It is not exactly clear when he came to realize that this grand vision was beyond realization. However, it seems to be the result of this realization that ICTP since Salam's time began to expand its coverage of areas other than theoretical physics, interpreted narrowly. Indeed, it seems to be the direction to go.
10. F. Hussain, "Salam, Saudi Arabia and Pakistan," can be found at the website http://bznotes.wordpress.com/2006/06/23/salam-saudi-arabia-and-pakistan-%E2%80%93-a-disgrace-by-faheem-hussain/.
11. N. Subramanian, "The scientist that Pakistan chose to forget," *The Hindu*, November 31, 2006, can be found at the website http://www.hinduonnet.com/2006/11/30/stories/2006113004621000.htm

12. See the following two articles that appeared more or less simultaneously. P. A. Hoodbhoy, "Science and the Islamic World — The Quest for Rapprochement," *Physics Today*, August 2007, pp. 49–55; and a profile on R. Mansouri, "A way forward for Islamic science," *Physics World*, August 2007, pp. 12–13.
13. Dreams have to go together with efforts on detail. I shall make this remark with no prejudice. In the part of the world from where Salam and I come, dreamers have been plenty but the ones that make the dreams come true are few. There are many reasons for this mismatch but let me quote from William Blake, regretfully without reference, to make at least one point: "He who would do good to another must do it in Minute Particulars: general Good is the plea of the scoundrel, hypocrite, and flatterer, for Art and Science cannot exist but in minutely organized Particulars and not in generalizing Demonstrations of the Rational Power." I am not a great fan of Blake but this particular statement rings true.