

Freeman J. Dyson B.A.*

R Rajaraman

That was how he was listed in the Directory of the Institute for Advanced Study, Princeton, when I looked his name up in 1966, to write to him seeking membership at the Institute. That was a shock to me, accustomed as I was to people, especially back home, ensuring that all their formal qualifications, including honorary doctorates and what not, were listed after their name on their CVs, letterheads, and visiting cards. Yet here was this great man, legendary even in the 'sixties for his seminal work putting quantum electrodynamics into a comprehensive framework, listed as merely a B.A.! And that is how he remained listed for the rest of his long life.

Why didn't he change it? Well, he HAD no higher degrees and was not just about to list the numerous honorary degrees with which he was decorated. Then why didn't he just drop that embarrassing lone B.A. after his name? Well, that would just not be Professor Dyson. He was a man of precision and truth, who would neither omit nor add anything to a factual listing. Besides, he was very proud of that B.A. and his alma mater Cambridge University. He also deeply disapproved of the whole PhD process, claiming that it was too restrictive. One of the reasons he has given [1] for leaving Cornell, which he loved very much, and moving to the Institute in Princeton was that the latter did not have graduate students, and he wouldn't be required to "guide" them!

Freeman Sir!

By the time of my first stay at the Institute ('67-'69), I had spent nearly 8 years in the US, first as a student and then as a faculty member. I had become quite Americanised in many outward modes of behavior. But I still carried the formal respect deeply ingrained in India towards older people and especially professors. Thus, I could never address my PhD advisor (Professor Hans Bethe) as Hans throughout my long association with him, till his death in 2005. Similarly, I would always address Dyson as Professor Dyson or as 'Sir'. He repeatedly told me not to do that and to just call him Freeman, like everyone else. Finally, I broke down one day and blurted out, "OK, Freeman...sir". He broke into peals of laughter and after that, let me continue calling him Professor Dyson! It was only many decades later, that too not face-to-face, but in written

*Vol.25, No.10, DOI: <https://doi.org/10.1007/s12045-020-1062-3>



REFLECTIONS

correspondence that I started addressing him as Freeman.

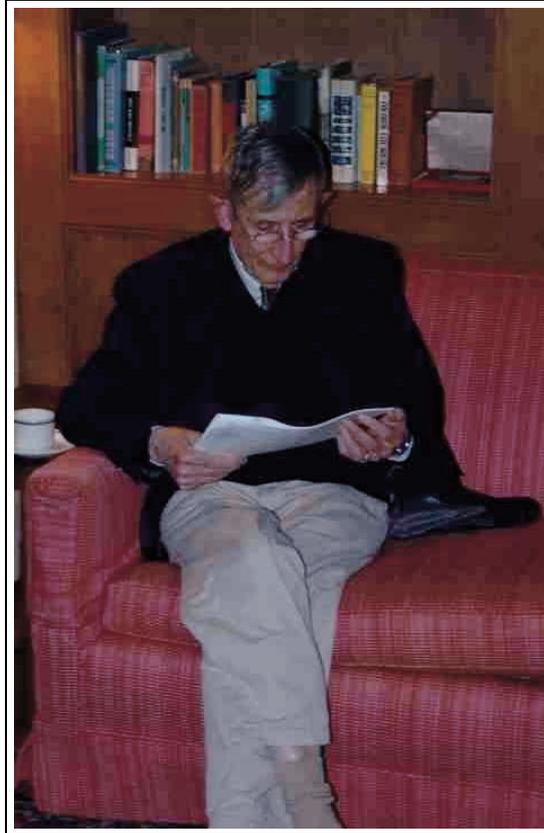
As a young student at Cambridge, he had wanted to work in applied mathematics because of its close relationship to physics. But he found that most applied mathematicians at Cambridge had been inducted by into the war effort. (Dyson himself had put in two years doing operations research work at the Royal Air Force Bomber Command.) So young Dyson ended up working in pure mathematics at Cambridge. His tutor at Trinity College was the distinguished mathematician Besicovitch with whom, I feel, Dyson came closest to having a *Guru-Sishya* relationship. In Dyson's own words, "In all my later work both in mathematics and physics, the influence of Besicovitch is clearly visible." But despite a brilliant start as a pure mathematician with a dozen journal articles, he retained his desire to pursue physics and joined Cornell University in 1947 as a PhD student under the supervision of Professor Hans Bethe. He was also fortunate in having the one and only Richard Feynman as a professor there.

The next few years resulted in arguably his most famous body of work. Enriched by his interactions with Bethe and Feynman, he created his seminal theory unifying seemingly different approaches to quantum electrodynamics. I will not elaborate here on this period of Dyson's professional life or its physics, since it has been extensively documented, not only in hard physics literature but also in popular books, thanks largely to the public interest in Feynman who had achieved rock-star status. (At that time Dyson was relatively less known to the general public, but in the decades since then he has written so extensively on matters of literary and public interest that he has, without ever trying to match Feynman, become equally "famous" on his own terms, and in a much wider intellectual domain. More on that later.)

Dyson did not stay long as a graduate student at Cornell, spending time at the Princeton Institute and the University of Birmingham before returning to Cornell in 1953, this time as a Full Professor. He seems to have been very happy there in a harmonious group presided over by the wise and kindly Bethe. Dyson nevertheless moved soon, in 1953, to the Institute for Advanced Studies (IAS), Princeton, for reasons I have mentioned earlier. (It was my personal misfortune that by the time I joined Cornell in 1958, both Dyson and Feynman had left the place. But Feynman would come by often to visit Bethe, and we students had plenty of opportunities to waylay him in the corridors.)



REFLECTIONS



Professor Dyson, at his office.

Dyson stayed on at IAS for the rest of his life, working prodigiously for over 65 years on an amazing range of subjects. In physics alone, apart from his seminal work on quantum electrodynamics and renormalisation theory, he discovered, with Castillejo and Dalitz, the so-called CDD poles in S-matrix theory. He used his mathematical prowess to unravel the properties of random matrices (with results applicable to nuclear energy levels), address canonical problems in statistical mechanics such as the Ising and Heisenberg spin models and the hard-sphere gas. He did monumental work on the stability of matter. Later in life, he was drawn to astrophysics....the list goes on.

Meanwhile, the engineering physicist in him took on problems in reactor physics with General Atomic, the reactor research branch of the General Dynamics Corporation. He also pioneered the so-called Orion project for propelling space ships using nuclear reactors—a very bold and unconventional proposal. In addition to his work involving nuclear reactors, Dyson was an



REFLECTIONS

active contributor to the literature on strategic aspects of nuclear weapon systems. He wrote extensively on nuclear disarmament and ballistic missile systems.

Along with everything else, he also kept producing, even in the last years of his working life, a stream of invited book reviews in that most erudite of book review journals—*The New York Review of Books*. He was a towering intellectual.

Although soft-spoken and gentle as a person, Dyson was no dove in military matters. As mentioned, he had already worked on England's war effort in his collegiate days and was equally willing to contribute to his adopted country's defense. While that did not make him a darling of liberals, he was not an uncompromising hawk either. I was honored, but not surprised, to see him in the front row of the audience at a talk I gave many years later on the hazards of nuclear weapons, organized by peace groups at a church in downtown Princeton.

In all those four years at the Institute, I never attempted to seek a collaboration with him on physics. He was deep into his work on the stability of matter and problems in astrophysics. As someone with a background in nuclear theory, I had no prior experience or expertise to offer in those topics. Besides, I had come there on leave from a faculty position in a "student mode" to learn more about particle physics. I could sense Dyson's wariness about mentoring young people. Fortunately for me, there were some great stalwarts in particle theory spending that year as Visiting Professors at the Institute, including Murray Gellman, Francis Low, and "Murph" Goldberger. I latched onto Francis and Murph and spent the year working on high energy limits of neutrino scattering, with a lot of guidance from them. The results were fairly interesting and were subsequently built upon by Okun, Gribov, Dolgov, and Sakharov in the USSR (this was before the emergence of Weinberg, Salam, and 't Hooft's renormalizable field theory of weak interactions. S-matrix theory was the best we had at that time for anything outside of electrodynamics!)

But although I did not do any physics with Dyson, he was extremely friendly and hospitable. We both had a common interest in literature, and he would organize post-dinner book-reading sessions at his home (Lily Harish-Chandra was one of the half dozen participants). He graciously attended any party I threw at my Institute apartment for colleagues. And in the four years I spent at the Institute, we must have had lunch a hundred times at the Institute cafeteria, sometimes *tete-a-tete* and sometimes as part of the physics group. [Lunching with Dyson one-on-one required some amount of self-control on my part. I tend to converse rapidly over a meal, whereas Dyson munched his food slowly and with great deliberation. After raising a question, one had to wait patiently for this process of his carefully forking a piece of his lunch and chewing it to be completed. Of course, it was well worth the wait since what came out was a clear and well-thought-out response.]



REFLECTIONS

Unfortunately, I don't have any photos of mine with Dyson from those days. I was too much in awe of him to even suggest it. Besides, at that age, one didn't realize the value of pictures for posterity! But, many decades later, I started visiting Princeton again, every summer, to the University's Science and Global Security Center in their Woodrow Wilson School. On each visit, I would invariably contact Professor Dyson and he would graciously grant me time to meet him at his office or over lunch at the Institute. On one of those occasions, he permitted me to take a picture of him in his office, which is reproduced here. My last communication with him was on the occasion of his 90th birthday celebrations at the Institute. I was invited but couldn't go, and instead wrote to him wishing him many more years of productive life and thanking him for his kindness over the years. He promptly sent a very nice and personal reply, which is reproduced below.

My Correspondence With Professor Dyson

On Thu, 17 Sep 2013, r rajaraman wrote:

Dear Freeman,

September 17th , 2013

I was delighted to learn of the "Dreams of Earth and Sky" celebration in honour of your 90th birthday later this month.

How I wish I could come to Princeton and join in the festivities! I continue to remember with gratitude your kindness to me throughout my two long visits to the Institute in 1967–69 and 1973–75. It was also very generous of you to have granted me an appointment despite your very busy schedule, whenever I sought one to say hello, during my Princeton visits in subsequent years.

Unfortunately, practical considerations make it difficult for me to make the trip from Delhi to Princeton. But please permit me to wish you a long life of continued productivity.

When they celebrate your 100th, I will somehow manage to come there!

With high regards,

R. Rajaraman

+++++

From: dyson@ias.edu To: doug1968@hotmail.com CC: dyson@ias.edu; doug0700@mail.jnu.ac.in
Subject: Re: Best wishes and high regards



REFLECTIONS

Dear Rajaraman,

I forget whether I used to call you Doug, and I certainly never called you Ramamurti. Thank you for your message. I have many good memories of your time here. Next week there will be a big mob of people. It would be much better if you could come to visit some other time when things are quiet. If you ever have a chance to come, you can be sure of a warm welcome.

Yours ever,

Freeman.

Suggested Reading

[1] Freeman Dyson, "Why I don't like the PhD system", https://www.youtube.com/watch?v=DzC1IRYN_Ps

Prof. R Rajaraman
Emeritus Professor of Physics
Jawaharlal Nehru University
New Delhi 110 067, India.
Email: doug0700@mail.jnu.ac.in

