Freeman Dyson

My first personal encounter with Freeman Dyson came as a graduate student at Princeton almost 60 years ago. Dyson already had a towering reputation, and he remained a fascinating enigma for my generation of students. At the time it was unusual for a professor at the Institute for Advanced Study to teach a course at the University. But Dyson did give a course on quantum mechanics during my second year; so naturally I attended as an auditor.

I recall that Dyson began by telling us, "If anyone tells you that they understand quantum theory, they are not telling the truth." We were fascinated by his lectures, and so I invited him with a small group of friends for dinner. A major discussion during that encounter was Dyson warning us that the biggest change in our lives would result from the economic development of China. This was a scenario that few people at the time were prepared to believe would change the world to the extent that it has. No one predicted at that time how China's economic emergence, and the accompanying government prioritization of education and research as a key priority to ensure China's future, would lead to the overwhelming pool of extraordinarily talented young Chinese mathematicians and physicists today.

My teacher Arthur Wightman had enormous respect for Dyson, and he often pointed to Dyson's many accomplishments in quantum field theory and many body quantum systems, including the Dyson series, the Dyson representation, his work on stability of quantum matter, etc., etc., etc. Wightman also said that Dyson's first draft of a paper would generally be its last draft, as he could formulate his ideas and words so coherently before setting them on paper. Furthermore, he reported that Dyson was a voracious reader; each day he could recount at lunch the new developments he read in the preprints that just arrived in the mail.

Dyson was also a familiar figure at the ETH in Zurich, where I have had close relations throughout my career. While I never had the pleasure to collaborate on a paper with Dyson, we were always on friendly terms. The title of my essay "Ordering the Universe" which appeared in Edward David's NRC report about mathematics research was inspired by Dyson's book "Disturbing the Universe." Dyson and I had interesting interactions whenever our paths crossed in Princeton, NJ or Cambridge, MA, and also not so long ago in Aalborg, Denmark and Dublin, Ireland. During Dyson's last visit to Harvard, he described his involvement in Project Orion, the design of a rocket propelled by fission explosions, and how President Kennedy himself decided to cancel its development.

I have long been fascinated by two of Dyson's essays. In his 1972 Gibbs lecture to the American Mathematical Society entitled "Missed Opportunities," Dyson describes the divorce between mathematics and theoretical physics, by saying "I missed the opportunity of discovering a deeper connection between modular forms and Lie algebras, just because the number theorist Dyson and the physicist Dyson were not on speaking terms." Thankfully the two subjects have had a reconciliation, so some persons like Dyson are once again respected both as mathematicians and as physicists.

In the 2009 essay “Birds and Frogs,” Dyson compared two approaches to discovery in mathematics with those creatures. “Birds fly high in the air and survey broad vistas of mathematics out to the far horizon. They delight in concepts that unify our thinking and bring together diverse problems from different parts of the landscape. Frogs live in the mud below and see only the flowers that grow nearby. They delight in the details of particular objects, and they solve problems one at a time. I happen to be a frog, but many of my best friends are birds…. Mathematics needs both birds and frogs.”

We will miss Dyson not only as a friend, but as an unusual visionary, unafraid to challenge conventional thought whenever and wherever he could.

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