

Visit by Russell Hulse to the Department of Physics of Drexel University
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The speaker for Drexel's Physics Department's weekly colloquium this past week (November 30th, 1995) was Dr. Russell Hulse of the Princeton Plasma Physics Laboratory. Although Russell was certainly known among radioastronomers and astrophysicists for nearly two decades for discovering the binary pulsar, his reputation was promulgated to the forefront of the scientific, and even the non scientific, communities by the Swedish Academy's pronouncement in the Fall of 1993 that he and his collaborator, Professor Joe Taylor of Princeton University, were awarded the Nobel Prize in Physics that year for the discovery. Although most of the invited speakers in the Physics Department's weekly colloquia were all heavy-weights in science (such as C K Chu of Columbia, Bruce Fryxell of NASA, Ernest Henley of University of Washington, Federico Capasso of A T and T and Joel Lebowitz of Rutgers), having a Nobel laureate amongst them still seems to add additional flavor, scientifically or otherwise, to our colloquia series.

Russ delivered what is known as the PAUL KACZMARCZIK lecture. Kaczmarczik is currently Professor emeritus, having spent something like half a century in the department. The department of today owes a great deal to a few builders and Kaczmarczik (together with Henry C Chen, Russell M. Wehr and Francis Davis) is certainly one of them. This lecture by Russell Hulse is the inauguration of this named-lecture, which will be held annually from now on.

As promised, Russ arrived at my office very promptly at 10:30 am. I was immediately struck by a tall, physicist-looking (if there is such a description) jovial fellow. He certainly "disarmed" me by his personality. After a little insignificant chit-chat, I took him to his first "appointment", which was to meet the students of our department (although it was a real pleasure for me to see that students from EE and biomedical engineering as well). For an hour or so, Russ gave the students a most enjoyable slide show about the Nobel ceremony. His anecdotal description was of course interesting and informal. I am sure the students who attended this session added something extra to their scientific repertoire. Who knows, one of them may find such information handy one of these days!

About 5 faculty and 5 graduate students went to lunch with Russ at our refurbished Faculty club. Since lunch is now a buffet style, it is particularly suiting for informal meetings. Hence I took the opportunity to introduce Russ to a number of colleagues in other departments (such as Bruce Eisenstein of EE and Albert Wang of ME). All seemed to be struck by the fact that Russ looked "young".

Conversation at lunch, while light, was about the difficulties facing science education in general, and about exciting youngsters, especially at the K-12 level, to science. Apparently, Russ has been very interested in tackling this problem for quite sometime. It appears to me that now he has the great opportunity since he could use, and probably has used the Nobel "altar" as a bully-pulpit to affect this monumental task! I for one certainly wish him luck in this direction.

From 1pm to 3pm, Russ visited the Department's neutrino physics group (Steinberg and Lane), Astrophysics and Cosmology group (McMillan and Centrella), Molecular Biophysics group (Ferrone) and the Nuclear and Nuclear Astrophysics group (Feng and Vallieres). It was unfortunate that our surface physicist (Dinardo) was out of town and time simply did not permit us to schedule a meeting with Dr. Yuan to talk about his interesting non-linear and chaos research. I think all of us who had the opportunity to interact with Russ found him to be exceedingly knowledgeable and inquisitive about our research. A good sign was that at every "station", it was difficult to tear him away from the conversation.

The colloquium began at 3:30pm. In the audience, there were at least faculty and students from 5 other institutions. Russ began with a short summary of what a pulsar is (namely the remnant of a supernova explosion). As a graduate student of Joe Taylor at the University of Massachusetts some two and a half decades ago, Russ was sent by Taylor to the largest radiotelescope in Arecibo, Puerto Rico, to sweep the sky for more pulsars in order to study their systematics and properties. The conventional wisdom at the time was that no binary pulsar could arise from such a violent cosmic explosion because the partner would be "blown to smithereens". Still, even if Hulse was only able to catalogue more pulsars in his work, the resulting thesis would still be a superb one (although probably would not have any accompanied accolade) because in order to carry out the research, he had to "scrounge" up the best computing system -- at the time -- to analyze the vast amount of data that were streaming in.

In total, some 40 pulsars were found by Russell. For each, he had to carry out the analysis of the period. Most, as expected, were in perfect agreement with the conventional wisdom, namely a single pulsar. However, there was one which behaved queerly. While to an untrained eye the period recorded by the computer for that one was only a very small fraction of the norm, it was sufficiently different from the rest that made Russ uneasy. I suspect that 99.9% of the scientists would have used "machine error" to convince themselves that there was nothing unusual, Russell, because he knew the entire system inside out, could not understand where this error could have come from. Only after months of painstaking analysis and data retaking that it was clear that this unusual pulsar was the "black sheep", that it is not a single pulsar but a binary one.

Binary pulsars are now an exceedingly important cosmic event for Einstein's theory of general relativity. For one thing, since the masses of the partners are of the order of 1.4 solar masses, and that their closest approach was comparable to the distance between the earth and the moon, space time could be greatly distorted. Thus, such a system is now an excellent naturally occurred laboratory to test one of the greatest human intellectual adventure of the 20th century: namely general relativity.

The talk by Russ was mesmerizing. It gave everyone in the audience a sense that they too were participants in this great scientific discovery. For the graduate and undergraduate students, it conveyed a sense of total dedication.

Clearly, scientific discoveries were never easily made. If one lacks total dedication and love for the subject, it would not be an absolutely beautiful experience but a profoundly painful one. After all, any dedicated scientists spent a large fraction of their research time in total "darkness". To make progress, they must be motivated by a deep commitment!

Epilogue

It was indeed a great pleasure for the entire department to see that our new president, President Constantine Papadakis, was able to come to the tail end of Russ' talk and greet him personally. The presence of the President at such a memorable gathering certainly gave the University a sense of uplift.