

My collaboration with Mahir Hussein along four decades

I first met Mahir Hussein in 1975, when I was a graduate student at the University of Oxford. He was there for a short visit and he proposed to start a collaboration when I returned to Brazil. He had finished his PhD at the MIT a few years earlier and moved to Brazil, accepting a job offer at the University of São Paulo.

In the beginning of 1977, I returned to Brazil. I accepted a position at the Universidade Federal do Rio de Janeiro and a few months later Raul Donangelo joined our Nuclear Physics Department. The three of us then began collaborating. Our first research topic was the use semi-classical approximations in the derivation of polarization potentials to account for the effects of collective excitations on elastic scattering. Progressively, our collaboration was extended to several other topics in nuclear physics. We wrote over 60 joint papers and published a book on Scattering Theory.

In our collaboration, Hussein would always bring creative ideas about the topics of current interest in nuclear physics and developed them with great energy. His knowledge of physics is remarkable. He has always been interested in many aspects of physics. He used to read lots of papers on different subjects, keeping in his mind their main results, so that they would be readily available when they were relevant to his research. His office has always been a mess, with papers and books spread over the desks, chairs, bookshelves and even on the floor. Once I said that it had no use to have this stuff scattered all over the office. It would be impossible to find anything there. He claimed to be able to locate any item and, to my surprise, he proved he was right.

He has never been very fond of computers. He used them exclusively for electronic mail. However, in recent years he made significant progress handling with computers. Nowadays, he can prepare powerpoint presentations (sometimes with some help) and even write his papers using latex. On the other hand, he is extremely good to perform analytical calculations and to get approximate results. He carries out complicated calculations with great speed, hardly making any mistake. Frequently, he thinks the calculations are too straightforward and presents them in a very compact way. In some occasions (mainly in our book), I spent some time to understand the math you proposed and, in the end, I thought I should fill in some intermediate steps so that an ordinary reader could follow them.

Hussein has two very important characteristics as a physicist. The first is that he is very good in introducing formal theories. The second is his ability to simplify them, without missing the relevant physics, so that they could be used to make useful predictions of observable quantities. In this way, he developed fruitful collaborations with different experimental groups, providing theoretical interpretations of their findings and proposing new experiments. One important example is the development of the São Paulo potential, nowadays widely used in the literature. This potential was first introduced by Marco Cândido Ribeiro and Diogenes Galetti, as an approximate way to take into account the effects of the

Pauli principle in elastic scattering. When Hussein learned about their work, he realized that it could be of great interest in the derivation of the effective potentials used in heavy ion collisions. He then started a collaboration with the authors and experimentalists at the Pelletron laboratory. This collaboration led to São Paulo potential, which has been adopted in several theoretical and experimental studies of heavy ion collisions.

As a friend, Hussein is really a great person. We have spent nice times in Rio, in São Paulo and in several occasions when we met abroad. In 1985, I spent a sabbatical year in Berkeley and he was a visitor there for a couple of weeks. We then found that he could be a great chef, expert in Arab cuisine. In several occasions he cooked in my place and my family and I were delighted with the Arab meals he prepared.

I have greatly enjoyed our collaboration and friendship along almost 40 years and I hope we keep it going for as long as our minds work.

Santos, October 14, 2014.

Luiz Felipe Canto.