

Remembering Jacques Raynal

The sad news reached us that Jacques Raynal passed away.

We lose with him one of the finest applied mathematicians specialised in particular in nuclear theories. Once you have met him, you will certainly not forget him.

He worked for many years at the theoretical physics service of the CEA; his office was in the open access area at Ormes-les-Mérisier, part of the Saclay Centre.

I have met him for the first time when in 1983 we had organised an International Nuclear Coupled-Channel Model Code Intercomparison exercise with the aim of verifying whether the different codes used around the world would provide the same solution to the same nuclear physics problem. Our big surprise was that his code had capabilities the others did not have: it was an order of magnitude faster and capable on the same computer make and unlike the other codes, to take care of a large number of couplings. His code, called ECIS would also carry out best fits on experimental data in order to extract nuclear model parameters. It provided not only the expectation values but the full covariance matrices, which were badly needed for expanding the information in evaluated nuclear data files with the purpose of estimating the uncertainties inherent to modelling. An unusual feature of this code, compared to others, is the choice of solving a problem either with the Schrödinger or the Dirac equation.

His youth was difficult, he had to flee during the Second World War when the Wehrmacht moved close to his village. After the war, when he returned, his house, the full village had been razed to the ground, so with his mother and brother they had to find a new place where to live.

He was what in France they call an "X", he had studied in the most prestigious École Polytechnique. Only the brightest could attend those schools. I had the impression that he did not have a boss; because he was so bright, he could research whatever he found original, interesting and new.

It took me some time to get really acquainted with him, as his way of thinking would follow several paths at the same time. With time I got used to it and so we had interesting discussions at lunchtime, about mathematics, science, and life. His was fond of adventures: when younger he would bicycle from Paris to Istanbul through the Balkans and back, on return partly with a boat from Greece to Italy.

One day he showed me a thick article that he had submitted for publication. Full sixty pages! I looked inside: it was full of mathematical formulæ. I asked him "And they published it?". "Yes, they did!" "What is it about?" "It is about hexagonal groups". "And what is it useful for?" "I really don't know". "Why did you write it then?" "Because nobody before me made this investigation". Two years later he told me: "I have received a letter about my hexagonal group paper today, someone is asking a few questions". "OK, what does he need it for?". "He is studying hexagonal viruses". Curiosity is the basis of scientific research; the benefits emerge later. This characterised in particular Jacques Raynal.

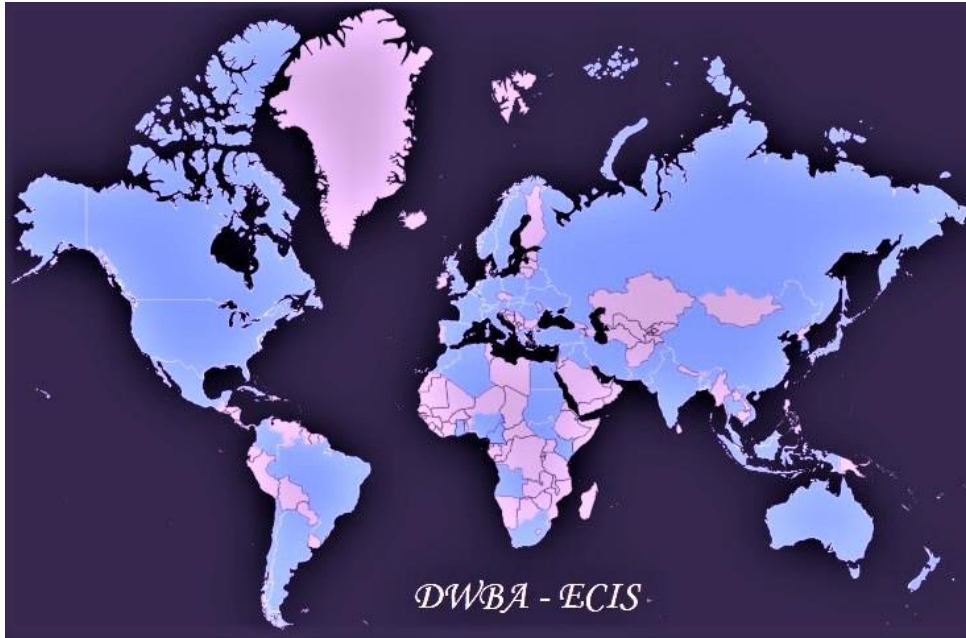
Among his activities was teaching at the Workshops on Applied Nuclear Theory and Nuclear Model Calculations for Nuclear Technology Applications, held at the International Centre of Theoretical Physics, Miramare, Trieste. There he was teaching the theory and use of two of his codes:

- DWBA/DWBB, elastic scattering with nucleon-nucleon potential and distorted wave Born approximation for inelastic scattering

- ECIS, coupled channel, statistical model, Schrödinger and Dirac equation, dispersion relation

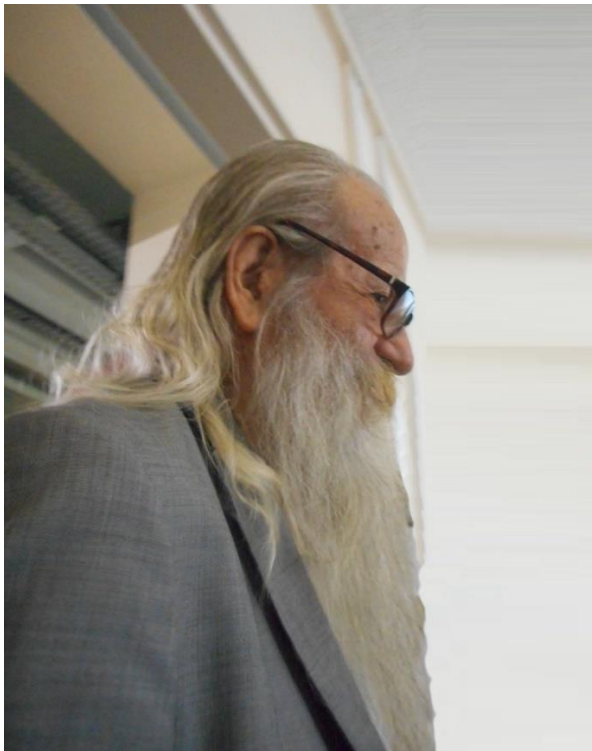
His ECIS model is so unique and effective that it was included in other nuclear model codes handling a wider range of problems.

Jacques Raynal's code ECIS has become indeed famous and is used in all countries; maybe not in all, but on all continents except Antarctica:



In blue the countries where his codes are used.

These codes are only one aspect of his work; I have restricted this description to the part I am familiar with.



Jacques Raynal, 2016

May he rest in peace.