



# The beginning of the Nichi's brilliant career

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**Abstract.** I report the development of Nichi's first research works in pulsar astrophysics just after his laurea at the Palermo University, where he was a student of Livio Scarsi and Bruno Rossi. Some personal memories are also given.

It was a nice September afternoon, and the flight from Torino to Roma was fine and unperturbed. The plane landed at the Fiumicino airport on time and, when possible, I turned on my mobile phone and immediately several messages arrived and their content was the same: they warned about the sudden death of the president of the National Institute of Astrophysics (INAF) Nichi D'Amico, one of my closest friends since more than forty years. Shocked and incredulous at this sorrowful event. I knew Nichi when he was still a physics student at the University of Palermo in the second half of seventies and from that time our friendship had always remained stable and strong. Since that day of September I remind frequently various moments we have shared.

## 1. The first papers

I would like to remember here the initial steps of Nichi in pulsar research, the beginning of a very successful career.

Nichi attended to the Laurea thesis work with the team that Livio Scarsi had trained in Palermo. The main program of the group and

the topic of its thesis concerned the development of a method for extracting pulsations in the gamma-ray data set detected by the spark chamber onboard the European satellite COS-B, launched in 1975.

In those years, I was working between Frascati and Palermo collaborating with the COS-B team, although I was not formally a member of the *Caravane Collaboration*. Scarsi was invited to give a talk about the pulsar observations in gamma-rays at a school of relativistic astrophysics which was to be held in Erice in September, 1977. At the time Crab and Vela pulsars were the only two known sources safely exhibiting a high energy pulsed emission, while indications for pulsation were reported for another couple of pulsars, never confirmed by subsequent observations. Livio proposed to Lino Buccheri, Nichi and to me a collaboration to devise some new criteria for an optimal search of other radio pulsars to be selected as best targets for observations at high energies. Shortly before the conference, Livio suggested us the possibility of introducing a parameter of efficiency to estimate the fraction of rotational energy loss emitted in the gamma-

ray band. A first report appeared in the school proceedings in the publications of the MPI für Physik und Astrophysik, but Livio proposed to write a more complete paper for explaining how the high energy emission efficiency could be related to the two main observable pulsar parameters, precisely, the period  $P$  and its first derivative  $dP/dt$ .

At that time, I was working with Marco Salvati on the calculation of the spectrum and of the pulse profile in the gamma rays emitted by a pulsar. Our approach was based on the gap model proposed by Malvin Ruderman and Peter Sutherland in 1975. Considering the same model, Nichi and I derived a simple relationship for the gamma emission efficiency which, for young pulsars, resulted proportional to the  $P^{8/7}/(dP/dt)$ , or, approximately, to the characteristic age.

The paper was written in a short time and Livio proposed to submit it to Nature as a letter. However, it was too long and the number of words was in excess of the maximum admitted for a letter. We then reduced the text and cancelled the section in which the efficiency relation was derived. The article was then sent to Nature and after about a month we received the answer: rejected. The referee's main objection was that it was not clear enough how the relation between efficiency and age was justified. After a short discussion we decided to restore the original version of the paper and to resubmit it explaining in the accompanying letter to the editor that it had not been possible to respect the limit of words for the sake of clarity and completeness. The new answer of the editor was different from the previous one and the paper was accepted without any change. It appeared in Nature in August 1978.

In the same year Nichi published two more papers, one in NIM and the other in Astronomy & Astrophysics, and this was Nichi's debut in the astrophysical research.

Nichi continued to work with the COS B team, but after a few years he went to Australia to work with Dick Manchester. Then he decided to continue the research work on pulsars but in the radio band. Back in Italy, Nichi moved to Bologna where he undertook an observational project with the Northern Cross. I

remember well when he took me to Medicina to see the equipment that were realized under his guide to reveal radio pulses and to measure the interstellar dispersion.

## 2. The mentors

In Palermo Nichi was a student of Livio Scarsi, who was a pupil of Occhialini and Rossi, and therefore he had a "noble" physical ancestry. One evening in Bologna Nichi and I were talking about the fundamental role played by Bruno Rossi in the birth of modern astrophysics and Nichi proudly told me that he was preserving as a relic the university examination booklet with the original Rossi's signature when he passed the final exam of the course. In fact, Bruno Rossi, after the retirement from MIT, was reinstated to a full professor position and was called at the University of Palermo, where he gave regular courses for a few years before the final retirement.

In addition to Scarsi and Rossi, the third mentor of which Nichi had a very great consideration was Richard Manchester at CSIRO who acquainted him with radio observations of pulsar. Nichi had a great ability that I have always admired: when, after having chosen a goal he was very able to clearly identify the best road map to achieve it and the main steps to be carried out. This skill allowed him to accomplish many important results in his career, one of the most important was the realization of the SRT, and was very useful during his presidency of INAF.

## 3. A personal memory

Finally, I would also like to write here a personal memory. About thirty years ago I went to Bologna to see Nichi and to discuss about a program of coordinated radio-gamma observations. I had an appointment with Nichi around 10 in the morning at the Institute of Physics, but strangely he was not on time. I waited for him and after about an hour he called by phone the secretary to inform me that he was in a hospital and that he would arrive late.

After about another hour he called me again and said that his health condition was

more serious than he expected and that they had to hospitalize him. I wished him all the best and returned to Rome. Nichi had a kidney tumor that was removed after a few days.

After about a year and half I spoke with Nichi by phone to be reassured: me too, I had

had the same symptoms and my ill kidney was soon removed. Nichi was for me an example to overcome the psychological difficulties to take on the near future and to recovery a normal life-style.