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Remembering Alfredo Dupasquier FREE

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Remembering Alfredo Dupasquier

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Abstract. Alfredo Dupasquier was a member of the "positron community" over a period of some 50 years and made substantial contributions to the science in this community. Here is a brief history of the Alfredo's life related to his scientific and human contribution.

EARLY YEARS

Alfredo Erberto Dupasquier was born in Naples on January 8, 1939. Alfredo's parents were Oscar Dupasquier and Lucia Biondi. A sister nine years older, Marisa, was the remaining member of the family. Alfredo spent his early childhood in Italy during the Second World War. Alfredo once told me "*I was extremely excited when at the age of six I went up the roof of my house to celebrate the end of the Second World War with my family*".

Alfredo at the age of 63.

Alfredo had a very good basic education and he continued studying for the rest of his life. He was fluent in several languages: English, German and Spanish, with a deep knowledge of Greek, Latin and Neapolitan. Italian and French languages were his mother tongues. He mentioned that Oscar, his father, spoke to him in French during his childhood, which was the original language of his father's family from French-speaking Switzerland.

After the successful first two years of university in Naples, he transferred to Milan in 1958 to study Nuclear Engineering at the Politecnico di Milano. This was a great challenge: each year only a selected number of people, ten in total, could enter this course, but Alfredo enrolled without problems. There in Milan, a few months after his arrival, he met Graziella, who from then on was his partner for the rest of his life. Graziella, before meeting Alfredo, had decided to suspend her studies at the high school to become a "fashion model". Alfredo, with his dedication to studying, also inspired Graziella to go back to high school and then to start at university. Alfredo graduated in Nuclear Engineering in 1964. The year after graduation Alfredo and Graziella were married. One year later, she also graduated in Economics and Business at the Bocconi University with the "gold medal".

Alfredo was passionate of life and nature. He liked horseback riding, skiing, scuba diving and travel by sailing boat. He was a lover of speleology, and visited and studied dozens of underground caverns during his youth. He liked also sports cars. Some of these passions he shared with his family and friends for much of his life.

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SCIENTIFIC AND HUMAN CONTRIBUTION

After graduating, Alfredo became a researcher and assistant at the Politecnico di Milano. Alfredo's first contributions in experimental Physics were with two experimental techniques: Positron annihilation lifetime spectroscopy (PALS) and angular correlation of annihilation radiation (ACAR).

Among Alfredo's numerous scientific achievements, one of them stands out at the beginning of his career. Together with Mario Bertolaccini, in 1970 Alfredo carried out work featuring experimental PALS results of alkaline halides, which contained a new modelistic approach for the data interpretation [1]. Mario Bertolaccini was an expert of instrumental electronics for nuclear applications, whose contribution mainly was to develop the necessary electronics to perform the PALS measurements. Alfredo performed the measurements and proposed, performed, and developed a new model to understand the experimental results. Formally, Alfredo was the first person to write the equations of what is now known as the "trapping model". This model then was generalized by Connors (1971) [2], Brandt and Paulin (1972) [3], and Frank and Seeger (1974) [4]. Alfredo's contributions to the "trapping model" were not widely recognized, and were cited only in few works such as Ref. 5.

Alfredo had a stay at the New York University (NYU) in 1970-71 to work with Prof. Werner Brandt. Alfredo not only carried out research activities with Werner Brandt, but he also had an academic position, becoming an Associate Professor at the Department of Physics NYU.

As above mentioned Alfredo was a member of the positron/positronium community over a period of some 50 years and made substantial contributions. His scientific activity takes place in the field of positron spectroscopy of the annihilation radiation applied to Solid State Physics and Materials Science. Among some of the most outstanding works of Alfredo are publications on the topics of positrons in ionic solids [6], the evidence of positronium-like or quasi-positronium states in crystals [7, 8], models for the study of nanograins [9], positron localization into vacancies or vacancy like-defects [10], and positron beams for the study of thin films [11, 12].

The main branch of research during the last period of the Alfredo's activity aimed at studying the formation of nanoparticles in a metal matrix, in connection with the technological applications of light alloys [13-17]. Additionally, he was one of the co-authors of the AEgIS Proposal for the study of the gravitational properties of antihydrogen at CERN [18] and, in particular, he was interested in the formation of positronium in mesoporous media at cryogenics temperature for antihydrogen production [19].

He has published at least 150 scientific articles, he has been invited to speak at numerous international conferences, and he organized schools and edited three of the most heavily consulted texts in *Positron Physics* that consider his favorite topic: "Positron Solid-State Physics" [20], "Positron Spectroscopy of Solids" [21] and "Physics with many Positrons" [22].

Alfredo spent almost his entire academic and research career at the Politecnico di Milano, where he worked hard with great independence without a mentor up to becoming a full professor of experimental physics. He was also full professor at the Faculty of Science of the University of Cagliari (1990-91). Alfredo was an excellent physics teacher. Generations of students have studied and learned thermodynamics thanks to the notes he wrote with that brilliant language which reflected well his personality.

He has held positions of coordination of research at the National Group of Structure of Matter (GNSM-CNR) and at the National Institute for the Physics of Matter (INFM).

Alfredo participated and promoted the development of the "Como Campus" of the Politecnico di Milano, a territorial extension of the Politecnico led by the passion of Prof. Pierluigi Della Vigna and others. Some count that Alfredo arrived in the autumn of 1989 for the first physics lecture of a degree course. After that, Alfredo offered to everyone to drink a magnum of champagne to celebrate the beginning of a new adventure.

It can be highlighted, above all, that he was one of the promoters and founders of the L-NESS (Laboratory for Epitaxial Nanostructures on Silicon and Spintronics), an inter-university research center in Como (Italy). The birth of the L-NESS at the Como Campus was thanks to the vision and determination of Alfredo and others, in particular Pierluigi Della Vigna and Leonida Miglio, from the Politecnico di Milano and the University of Milano-Bicocca, respectively. Of course, a center of this type could not be viable without a critical mass of research infrastructure and human resources. Decisive factors in the founding of the L-NESS were the financial support for the building and infrastructure provided by the Politecnico di Milano. Another important factor was the decision of Professor Hans von Känel of the ETH (Switzerland), to move his semiconductor epitaxy laboratory from Zürich to Como. The first operative laboratory of L-NESS was the Positron Laboratory in 2001. The L-NESS then officially began to operate in 2002, when an agreement was signed between the Politecnico di Milano and the University of Milano-Bicocca. The Department of Physics of the Politecnico agreed to transfer, together with the Positron Group, its activity on epitaxial

growth of magnetic oxides for spintronics from Milano to Como and open a new research activity on semiconductor devices. The Alfredo's group installed a new coincidence Doppler broadening setup together with the already existing PALS equipment. A new continuous and electrostatic positron beam, designed in the Kelvin Lynn's laboratory by Asoka Kumar at the Lawrence Livermore National Laboratory, was then installed at the L-NESS and become operational in 2010.

Alfredo has collaborated scientifically with many people and many of them became his friends. Some of them are: Antonio Bisi, Luisa Zappa, Lucio Braicovich, Werner Brandt, Allen Mills Jr., Antonio Zecca, Giampiero Ottaviani, Roberto Brusa, Alberto Somoza, Giuseppe Riontino, Paola Folegati, Gianclaudio Ferro, Maurizio Biasini, Grzegorz Karwasz, Kelvin Lynn, Ian Polmear, Simon Ringer, Martti Puska, Ilya Makkonen, Alberto Calloni, Marina Iglesias, Fabio Moia, Nieves de Diego, Walter Salgueiro, Carlos Macchi, Gianni Consolati, Fiorenza Quasso, Marco Giammarchi and many others, including myself in the last 20 years of his carrier.

FINAL YEARS

Just after his well-deserved retirement, one of last Alfredo's goals was *go around the world in a sailing boat*. Alfredo was very serious about this challenge, for this reason he had prepared and maintained a good physical condition. Alfredo idea was to complete the trip at 73 years of age in 2012, departing from Panama and, in the first part, crossing the Pacific Ocean. Before that, in December 2011, he spent his family holiday sailing through the Pacific Islands near Panama. So, meanwhile, he was preparing for the new challenge.

On December 27th 2011, when he and his family were around the Barbacoa Island zone, tragically, Alfredo suffered a fall when climbing into a hammock on the sailboat that caused a cervical injury between the third and fourth spinal disc that impeded his mobility irreversibly. After this event, unfortunately, Alfredo became quadriplegic for the rest of his life.

In 2012, Alfredo spend eight month at the Niguarda Hospital in Milan (spinal unit). Finally, he was transferred home. The situation was not easy, but Alfredo always had courage and humour, also in the most difficult moments. At home, he was attended 24 hours a day by specialized personnel.

In these final years Alfredo was always surrounded by affection. His wife Graziella and his daughter Gini were always at his side. He was able to enjoy his two granddaughters for almost four years. His friends, his sister, and other relatives visited him periodically.

Only a tumour in his neck that affected him the last year of his life could defeat him.

Alfredo died in Milan at the age of 76 on September 20, 2015, just when the 17th ICPA conference in Wuhan, China, was starting.

September 21th 2015

(E-mail message sent to the colleagues of Politecnico di Milano during ICPA-17 meeting)

After a complicated journey and after being able to sleep only a few hours I woke up in a strange place with a message from Graziella (wife of Alfredo Dupasquier) saying: "Alfredo is dead". I am shocked, I really think that I am still in a dream, in China, to participate at the International Conference on Positron Annihilation to which Alfredo has been assisting for decades and of which he was part of the Scientific Committee. Today, I had a presentation talk about the things that we have debated with him several times and on which he taught me so much. It seems to me yesterday the day of fifteen years ago when I came in Italy to work and learn from him. In addition to a teacher and colleague, he was a friend, even a father to me. I am pleased to read messages from colleagues of Politecnico di Milano that

have been able to know about his science, his charm, his elegance, his weaknesses, his generosity, but above all of his humanity and friendship.

The last few years have been very hard for him. Nevertheless, he never let himself go, as long as I went to him he made me laugh with his occurrences even when he could hardly speak anymore.

I would only like this to be a dream, and not to wake up in a world without Alfredo.

Thanks Alfredo!

Rafael

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