

# ROBERTO PETRONZIO AND THE “TOR VERGATA” THEORY GROUP

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## ABSTRACT

I present some recollections of the first years, in the 1980's and 1990's, of the Theoretical Physics Group of the University of Rome “Tor Vergata”. I will focus on my interactions with Roberto, which were particularly intense when I was helping him with the key course on “Quantum and Statistical Mechanics”, but also on the role that he played in shaping the very structure of the group, and of the University at large.

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# 1 A bit of Pre–History of the “Tor Vergata” Theory Group

The “Tor Vergata” Theory Group was founded, on paper, in 1981. This happened when Giorgio Parisi and Nicola Cabibbo decided to join the new University of Rome, which was being planned at the time. When I was preparing my lecture, Giorgio told me that Gianfranco Chiarotti, the key figure in the process for the Physics Department, was then trying to shape the new creature by encouraging a selected group of professors to move there from the University of Rome “La Sapienza”. Classes finally started in the Fall of 1984.

Moving, probably, was no easy choice. One would be leaving a Department that had played an important role in Physics, at the international level, during the preceding decades, and also a building that was comfortable and well equipped, if somewhat crowded. Still, the emergence of a new University must have created high expectations, although one could anticipate daily struggles with long queues on the outer ring of the city (“Raccordo Anulare”) and some delay before the new Institute would attain proper facilities. Initially the two selected professors could merely plan matters from their original quarters at the University of Rome “La Sapienza”. Then they started to teach introductory classes, since students make their first acquaintance with Theoretical Physics only in their third year. However, growing numbers of students started quickly to enroll, which vindicated their original choice. Many students were probably attracted by the new location, close to the highly inhabited southern end of Rome but also to the hills of Frascati, which had long hosted a sizable community related to the INFN and ENEA Laboratories. Moreover, a smaller–scale Institution, which would favor direct interactions with the Faculty, must have proved alluring for a number of students and their families. Unfortunately, the City Council was not ready to extend the subway system in the area when this would have been relatively simple and not overly expensive.

I entered the group together with Francesco Fucito (former Director of the INFN Section of Roma 2), Graciela Gelmini (Professor at UCLA) and Enzo Marinari (Professor at the University of Rome “La Sapienza”). We were the first people to be hired anew, as Junior Faculty members, in the Theory Group. At the time I was a Miller Fellow at U.C. Berkeley, after completing a Ph.D. in Theoretical Physics at Caltech and a one–year Post–Doctoral Fellowship also at Caltech. I started my service at the University of Rome “Tor Vergata” on April 30, 1985, but I was readily granted a leave and returned to Italy for good in the fall of 1986.

I still recall the excitement for the new, very strong Theoretical Physics group, which was



Figure 1: The “Romanina” building lies near the beginning of the Highway to Naples, on the “Raccordo Anulare”, the outer ring of Rome. Originally it was the only site of the new Institution, but it was soon confined to hosting only a small portion of its Departments and the central Administration.

being formed! For one matter, the two professors that had created it were two leading figures in European Science, and interestingly the pattern repeated itself, to some extent, in the whole Physics and Mathematics Departments. I would dare to say that there was an atmosphere that I have rarely witnessed in my professional life. Still, there were serious problems, and for one matter the whole University was originally stuffed in the “Romanina” building (fig. 1). The building had been conceived for other purposes and could serve at most as a starting point, but there was little else until the end of 1988. It then continued to host the central Administration, including the Rector’s office, the Bank, a few Departments and other services. The acquisition of the “Romanina” building marked the actual inception of the new University, and this step makes up an interesting story in its own right, since the State had requisitioned it from, let us say, “non-canonical” entrepreneurs.

At the beginning, the Theory group was only granted a pair of large offices in the “Romanina” building. They were equipped with good furniture and small blackboards, and could host reasonably well about four people altogether. However, even leaving aside the two professors, who would have deserved two individual offices for their own sake, there were at least five people to begin with. Spending the day in those offices was not comfortable, but I could work conveniently at home and made no effort to squeeze in. This was actually true for most of us: we would teach at the University and we would meet regularly for seminars and discussions, but our scientific lives

were unfolding either in our homes or at the University of Rome “La Sapienza”, where several group members had kept some desks and still maintained some ongoing activities. Nonetheless, we readily started a good seminar program and we developed regular interactions with colleagues at the nearby Mathematics Department. Before returning to Berkeley, I had also helped Nicola Cabibbo to arrange that we receive preprints from nearly everywhere, which was a key asset in the pre–arXiv era. All in all, we were very active on several fronts of Theoretical Physics and everything hinted to a bright future but, fairly enough, we were not nearly a group yet.

## 2 Roberto Joins the “Tor Vergata” Theory Group

Roberto showed up in the early months of 1988, and made it a point to spend, from the very beginning, all his working days in the office, despite the problems that I have mentioned. In this fashion, and largely thanks to him and to his efforts, the Theory Group quickly attained a proper institutional status. Our first encounter took place in one of the “Romanina” offices, but I have long felt that perhaps we had already met briefly at Caltech, in the Fall of 1979, in the aftermath of a big Conference. However, somehow I never told him <sup>1</sup>.

There was a positive atmosphere in Italy in the late 1980’s, which reverberated in many aspects of our lives. New rules had come to fruition after a period of unrest, and Academic careers were conforming to well–established international patterns. INFN was providing ample support for Theoretical Physics, so that we could attend stimulating Schools, Workshops and Conferences, and we could also invite relevant visitors with little or no restrictions. After moving to the United States at the end of the 1970’s, when things were not as simple, I had greatly benefitted from one of their well established Ph.D. programs. Amusingly, Italy also happened to start a novel Ph.D. program more or less when Roberto arrived.

Although I appreciated the importance of Roberto’s message, I continued to work a lot at home, also with Massimo Bianchi and Gianfranco Pradisi, whose student years fell precisely within this period. My interactions with Roberto and other colleagues were often quite stimulating, since their education complemented my own, but our research goals were markedly different. I was not alone, however, since Massimo and Gianfranco grew quickly into very competent juniors working at the forefront of String Theory. The ongoing transition to the Ph.D. system proved beneficial

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<sup>1</sup>My suspicion was finally, and unexpectedly, confirmed during this Workshop, when Gabriele Veneziano mentioned in his lecture a Conference, held at Caltech around that time, where he and Roberto presented some joint work on QCD.

for both: Gianfranco started his Laurea Thesis at the end of 1986, while Massimo, who had graduated a few months before, started a two-year INFN Fellowship more or less at the same time. When the three-year Ph.D. program started at the University of Rome “La Sapienza”, INFN Fellowships could precede it, while the Laurea Thesis retained for a while an advanced character. The resulting opportunities were thus comparable, in many respects, with what a good American University could offer.

When he arrived from CERN, Roberto was thus confronted with a stimulating, rapidly moving system that was perhaps a bit disordered but was full of opportunities and allowed much flexibility. Unfortunately, we seem well past that peak today, given the multitude of errands that fill our day and the constraints that are affecting our Academic life.

### 3 The “Sogene” Complex

Despite Roberto’s efforts, a real Institute life had to await the completion of the first new buildings, but fortunately that did not take too long. We had actually used some classrooms there since the end of 1986, but in the Fall of 1988 we could finally move into our new offices (fig. 2). Initially, only Full Professors obtained individual offices, while pairs of Associate Professors and/or Junior Faculty members had still to share offices in various combinations. However, more space added up within a few years, when other Departments moved from portions of the “Sogene” complex to their final destinations in the central portion of the campus. Associate Professors thus attained individual offices, while laboratories also grew in size.

We were all very happy and excited when we sensed that in a few months we would finally acquire more space. I recall that, when Gianfranco was completing his Thesis, we went a few times into my new office, which was furnished and essentially ready by the summer of 1988. Roberto would also visit the place from time to time, to keep an eye on its development and also, I suppose, to try to sense the flavor of a real Institute life. Unfortunately, serious structural issues have emerged, over the years, with the “Sogene” complex, which is also far from the main campus services.

At any rate, a nice and friendly atmosphere built up naturally in the new Department, which was full of young and highly motivated people: throwing a party and spending some time together before the Christmas Holidays became quickly an established tradition. People used to look forward to these informal gatherings (fig. 3).



Figure 2: The “Sogene” complex. This structure comprises two main portions, and the one hosting the classrooms was ready since the end of 1986. The offices were essentially ready during the first half of 1988, and the Department settled in toward the end of 1988. When the Engineering and Economics Schools moved to their final destinations, the space allotted to the Physics Department nearly doubled.

#### 4 The “Quantum and Statistical Mechanics” Course

In the Fall of 1988 Roberto started to teach the “Quantum and Statistical Mechanics” course. The student flux had reached by then a steady state: 100 students or so used to enroll for the first year, and about 30 of them would reach, with some delay at times, the third year. This was clearly an ideal state of affairs for teachers and students alike. Roberto used to lecture for about 80 hours, and I complemented his effort with about 50 hours of recitations, solving illustrative examples or touching upon some additional topics. The course represented, traditionally, the main contribution of Theoretical Physics groups in Italy to the education of undergraduate students. “Quantum and Statistical Mechanics” and the parallel “Mathematical Physics” course, which was taught for several years by Giancarlo Rossi, filled for our third-year students the first semester, which was perhaps the single most challenging period of their whole undergraduate course.

The “Quantum and Statistical Mechanics” course was a real turning point for our students. They struggled through it, largely with strong motivations, which in some cases would emerge more clearly within a second, more mature, attempt. When some students would occasionally feel stressed, we used to emphasize that they were in the middle of a real transition from beginners to (almost) professionals! I recall that several of them acknowledged that this was indeed the case,



Figure 3: One of the first Christmas parties, with Roberto and other Faculty members that some people will not fail to identify.

some time after passing the final exam.

I am not aware of any student who felt unhappy about Roberto in those years, despite the pressure that both of us were putting on them. Roberto was serious, properly demanding but had always a friendly touch and an inner respect for young students. He was always available and was readily helpful if solicited, so much so that none of the students was afraid to knock at the door of his office, at any time of the day. Our relatively small classes clearly favored mutual interactions and made it easier to ask questions during lectures. They also allowed us to offer, with little effort, a number of intermediate tests that helped and monitored the learning process, in addition to the more standard final exams. We spent many long afternoons with Roberto to build up proper tests and to improve on them. In retrospect, those discussions sharpened my understanding of Statistical Mechanics, and we often ended up touching the border with research proper. It was largely my fault if they never developed into a real scientific project, since I was too concentrated on a large and highly demanding problem that has stayed with me for years. Still, our discussions helped me considerably with my research in the following years.

We went on together from the Academic Year 1988-89 to the Academic Year 1991-92. At times I used to go a bit too far or too fast in class, carried away by my enthusiasm (and by my limited experience). Roberto, when alerted by some concerned students, would try to slow me down in his style, with gentle but clear words. I dare to say that we really enjoyed spending together a good fraction of our office time in those years, and for sure this built much mutual respect and a nice friendship. Many good physicists who are currently engaged in teaching, in scientific research or in extra-academic activities, emerged from those classes.

## 5 Roberto's "Laurea" and Ph.D. Students

Roberto started right away to follow "Laurea" students, and Luca Biferale was his first student at "Tor Vergata". When our independent Ph.D. program started, in the early 1990's, Roberto strived to organize its courses and its overall plan with a few other colleagues. The program proved successful, and within a decade a fair number of our Ph.D. students ended up in Academic posts in Italy or elsewhere.



Figure 4: Roberto with a group of Ph.D. students in the early 1990's.

Roberto was particularly friendly with Ph.D. students. They were more mature and thus more ready to interact with him or others on long-term projects, but they were also spending a large fraction of their time at the Institute <sup>2</sup>. This was a widespread source of enrichment for all of us. It also encouraged many people to try and get to know one another, and interestingly the University used to provide good quality lunches at very reasonable prices in one or two nearby cafeterias. Many of our students would thus join Faculty members around lunch time, and they would all walk together to the closest cafeteria. These gatherings were nice opportunities to socialize with others, and particularly for the Ph.D. students who were coming from elsewhere or for our Post-Doctoral Fellows and visitors.

Roberto would not confine his lunch gatherings to his own Ph.D. students (I can count 7 or 8 of them within the decade stretching from the late 1980's to the late 1990's), but would welcome students working in other groups and would use these opportunities to interact with them, and

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<sup>2</sup>Several undergraduate students would also be around extensively, in particular when working on the "Laurea Thesis": the very location of the Department favored this type of arrangement. For graduate students, however, this pattern was the norm: several junior scientists would thus populate the Department for a few years in a row.



often to provide some advice on their studies. Occasionally, the same groups of Faculty and students would also meet outside, so that serious research efforts could blossom within a friendly, relaxed atmosphere (fig. 4).

## 6 Roberto Moves on to New Tasks

Our joint teaching activity ended in the fall of 1992, when Roberto started to give the more advanced “Theoretical Physics” course. I became an Associate Professor in 1994 (after winning a competition in 1991, and then again in 1993, due to a long delay caused by a Committee member). In the fall of 1992 Roberto urged me nonetheless to give a new course on “Classical Field Theory” at “Tor Vergata”, and I was also invited to teach the “Theoretical Physics” course at the University of L’Aquila, after Roberto suggested my name to some colleagues there. I am emotionally attached to the area, since my family originates from Amatrice, and therefore I accepted with enthusiasm the extra load, and I even returned there for a second time in 1996. It was a nice experience, and in retrospect I was fortunate to spend some time at L’Aquila before the earthquake that devastated it. I also met several valuable students there, and I contributed to the education of some of them. These include Carlo Angelantonj, who studied at L’Aquila while spending at “Tor Vergata” a large portion of his Ph.D. years. Massimo Bianchi should be credited for creating this opportunity, but Carlo made the best out of it, and then collaborated intensely, over the years, also with me and with other group members.

We continued to interact regularly, if more sparsely, with Roberto over the years, and he also asked me to teach the “Theoretical Physics” course during the Academic Year 1997-98, when he left for a sabbatical at CERN.

During the 1990’s Roberto started to devote himself to scientific management, and reached progressively higher levels of the hierarchy. He pursued a career that would eventually culminate in the Presidency of INFN (our “jewel”) for two terms. Prof. Ferroni, the current President, has stressed in the Workshop what our community owes Roberto, for his efforts of the late 2000’s have safeguarded the cherished scientific and administrative independence of INFN.

Despite his increasingly demanding commitments, Roberto continued to teach regularly at “Tor Vergata”, with a high sense of responsibility, throughout the 1990’s and beyond. He was clearly less available, however, and he needed to manage very attentively his hours at the Department. This was possible to a large extent thanks to Carla Felici, who soon became his real shield. Carla

was deeply attentive toward Roberto's needs during his years of intense administrative activity, and then manifested a moving affection to Roberto and to his family during his unexpected long illness.



Figure 5: In the Dolomites with Roberto, who was taking care of the grill. I was keeping an eye on the matter, but I have never felt comfortable with starting a fire. More standard cooking is another story, although a fair assessment of my skills remains apparently controversial.

## 7 Conclusions

To conclude, I would like to stress again how the “Tor Vergata” Theory Group really started when Roberto arrived, and largely thanks to his presence and his efforts. Discretely and yet effectively, he did his best on several occasions to support our needs, and to look after the University as a whole. Roberto never left Tor Vergata although, as I have said, he became inevitably less present when his involvement with INFN increased. Still, he continued to grant his attention to a number of facts and problems of the University, so much so that when he was caught up in the road accident he was returning from CERN, where he was starting a sabbatical year, to meet the Rector and the Head of the Physics Department.

Roberto and I worked on different research problems, so that we did talk often but we never ended up collaborating on current research. I still recall distinctly, however, how in the late 1990's I did manage to get him openly excited about my work, when we discussed some aspects of it that were more in tune with his interests. On a more personal note, I cannot resist to add that I owe Roberto much more than can be said here. When I visited him in the Hospital at Monte Catone

I even managed to extort him a big smile, despite his illness, when I provided a concrete example of how the reverse was not true!

Roberto and I were closer than we probably both realized. I often missed him after I moved to Pisa, while he called upon me, on a number of occasions, for INFN duties or related activities. Our many discussions have surely played an important role in my research. Finally, we also spent some charming time together in the mountains that we both loved. However, this could only happen in the Summer (fig. 5), since I could not possibly follow him on snowy trails!

This Workshop aimed at celebrating Roberto’s memory allowed me to meet again many colleagues and to recollect many good memories. Unfortunately, the Workshop was preceded by the sudden death of Yassen Stanev, who was very dear to me and to many other colleagues. Yassen had studied in Sofia with Ivan Todorov, in a group that has contributed significantly, over the years, to Quantum Field Theory. He had joined the “Tor Vergata” Theory Group in 1994, in the middle of the period that I have tried to highlight, as an INFN Fellow. After a few years, he was hired by INFN as “Primo Ricercatore”, the counterpart of an Associate professor position, and during the last years he had also represented the “Tor Vergata” group in the INFN Theoretical Physics Committee. I spent with Yassen an important portion of my scientific life, and I take the freedom to thank his beloved wife Antonia for granting me, for many years, the privilege of their solid and reserved friendship. I shall miss deeply both Roberto and Yassen.



Figure 6: In the mountains again, this time near Amatrice. Yassen Stanev, his wife Antonia and their son Denis, who was about one year old at the time, in 1998.

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