

## Few recollections from/with Costas



When I arrived for a postdoc at ENS, Costas was a fellow at CERN

We first met a little later, at the HEP Europhysics Conference in Brighton in July '83

One could hardly miss Costas, despite the big crowd.

He was in the middle of a very noisy and colorful group (Eugene, Sergio, Dimitri and others) all beaming with the prospects of (no scale) supergravity, but also of the food & disco plans for the evenings. As always with Costas, energy and entropy were diverging !

Coming from the more austere american academia, the whole thing was for me a cultural shock -- it felt like being immersed in a Fellini movie.

We did not talk much physics at this time.

Our interactions started in California the year after.

Costas had moved to Berkeley for a second postdoc (after entering CNRS); he shared an office with Paul Windey, in the "smoker's exile aisle"



*with Marty Halpern a  
frequent visitor*

Myself and Ignatios were postdocs at SLAC, 50 miles to the south

It was a marvelous time. Green and Schwarz had just launched the first string revolution and the air was thick with excitement.

None of us four knew anything about strings, but we dived head on, reading large amounts of papers & trying to find some convenient entry point.

We found it in 2d CFT and the worldsheet theory, and wrote a paper on how to realize worldsheet susy using only fermions.

*This was the preamble to the fermionic construction of 4d strings.*

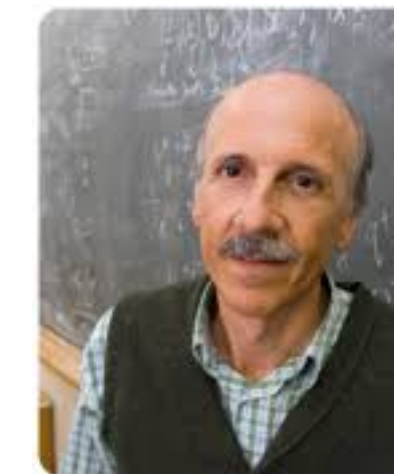
We worked frantically for about a year, mostly in a tiny office at SLAC  
(soaked in smoke till to the early morning hours)  
and towards the end scattered between Palaiseau, CERN and LBL



**UV**



**RG flow**



**IR**

Costas' stories from this period could fill a book. One was his legendary return from Paris with PeopleExpress, when grass in the turbines kept the plane on the ground in Brussels for two nights. After at last landing in SF, his taxi caught fire burning some of his luggage in the trunk. In the end, a cheap one-day trip he had bragged about, lasted 3 days and cost three times the price.

Costas, as you know, was a force of nature, and his very presence was  
an amazing accelerator of collaborations

While the paper was being written, he would go to conferences to talk about 4d strings (as the more senior and better known author he was the one invited). In these pre-arXiv days, the priority was not counted in days and several people knew about our work. Being the better english speaker, I was charged with the final writeup. Frustrated Costas called me one day asking to "send him a few english sentences" and he would do the rest.

*our paper:*

Nuclear Physics B [Volume 289](#), 1987, Pages 87-108

Four-dimensional superstrings

I. Antoniadis, C.P. Bachas, C. Kounnas

contributed to break away from geometry (compactification à la Kaluza-Klein)  
showing that notions like curvature and even dimension were low-energy  
approximations that could be given up.

In retrospect, this was also one of the first explorations of the string **landscape**

The *Candelas et al* paper had shown the existence of large families of N=1 CY manifolds that gave vacua of the effective supergravity. But it raised a host of questions: Did these survive stringy (alpha prime) corrections? Was there a selection principle? How to compute the spectrum since even the CY metric was not known?

Our work, together with several other key papers

*Dixon et al; Narain; Kawai et al; Lerche et al; Gepner*

settled these questions by showing the existence of landscape of (flat) vacua, all equally legitimate, still at our present level of understanding.

It was also a most convenient framework for systematic efforts to embed the Standard Model in the heterotic string.



Once back in Paris, we all took our first PhD students (Marios Petropoulos, Marco Picco, Bruno Rostand) and had the good idea to have them grow hand-in-hand

But soon after, Costas left spending much of the 90s at CERN,  
so our interactions became more scarce.

We met again in the years 2000 at ENS, and although we did not coauthor any more papers, our discussions and "scientific fights" were as always fierce. Talking to Costas was both exhilarating and exhausting: he was often right, and (of course) hated to admit defeat when wrong. He would try to shoot down the adverse argument from all possible angles. In these cases the hard problem was to put an IR cutoff to the discussion.

**I look back to all this with great nostalgia.**

Costas directed the LPTENS from 2009, passing on the hand to me at the end of 2013. So I saw him at work also in this function.

Costas had a deep attachment, and was very proud of the laboratory and of its members. While his health- and other problems accumulated, he never stopped thinking about the LPTENS and its future.

In retrospect, I think his appraisals of situations was most often right despite the seemingly chaotic process through which he arrived at them.

He had a rare intuition about both physics and people, even if he could not always communicate it in an articulate way.

*There is so much more to say about Costas that one could go on for hours.*

Costas was excessive in all his attributes. He was surely the most generous person I have met; he would take great pleasure in sharing his ideas, his friends, all aspects of his life. His optimism and self-confidence, even in the highest adversity, knew no bounds. He was also as reckless with his own health as one could possibly be.

One of the last times we met he was coming out of hospital following an operation. Kakia was in Cyprus by that time, and I suggested he come sleep at our place in case of a night emergency.

Costas arrived with Hervé (who was a great help for him in these very difficult times). As soon as he entered the door, in a rather sorry state still recovering from anesthesia, Costas asked for whisky.

He also explained very persuasively, that doctors had prescribed hard alcohol for wake-up. I think we managed to refute his arguments this time, by carefully reading the post-operation instruction sheet he was given.

Augusto Sagnotti used to say that if Costas did not exist he should have been invented; but I doubt if any writer would have the imagination to do the job.

**Costas was a genuinely "good man"**

**He marked physics, and marked our community**

"Costas" is not a very differentiating forename in Greece,  
and not so in theoretical physics:

Costas Sfetsos, Costas Skenderis, Costas B., Costas Anagnostopoulos

Costas Siampos, Costas Pallis, Costas Farakos, . . . .

But by default, "Costas" referred first and foremost to Kounnas,  
who was always in the center of all things (and loved it !)

two happy moments of Costas



finally many thanks to George who had the idea of this day,

to Alekos and to Ifigeneia for the hard work

and to all of you who travelled here to honour Costas' memory