

# An Unusual Internship at CERN

## Part I



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The 2019 openlab Summer Students ( the best so far ;) ). Image by CERN.

I do not exaggerate when I say that this summer was one of the best I have ever had (it sounds like a *cliché*, right?). Why you may ask? Long story short, I have spent the last two months at CERN, the *European Organization for Nuclear Research*, as an openlab Summer Student where I had the opportunity to work as a software developer and researcher.

I was part of a group of 40 other amazing students coming from all around the world (USA, Canada, India, Brazil, Germany, Italy just to name a few). We were hosted in the same hotel where we spent 9 weeks living together by also sharing many beautiful moments. Besides working at CERN, we also attended several

organized lectures and we participated in many visits to external organizations (like *IBM*, *OpenSystems* and *ETH Zurich*) and to CERN itself (e.g., some of the experiments, like the *CMS* or the *Antimatter Factory*).

## How did it work?



The Globe of Science and Innovation just near CERN

Each year CERN offers several internship opportunities to Bachelor's and Master's students. There are mainly two programs: the *general summer student program* and the *openlab summer program*. I will focus mostly on the second one since it is the one I have participated in. The openlab summer student program targets *computer scientists* and *IT specialists* rather than *physicists*. Both programs, however, share some common traits: each student is assigned to a project and there are also lectures offered by CERN staff on several topics, ranging from *theoretical physics* to *machine learning*.

Usually, the application period opens during November-December and the results of the selection process are given out during April. The prospective students must attach to the application a *CV*, at least *2 letters of recommendation*, and a *motivational letter*. Another important point is that there is no formal face-to-face interview! You will be selected solely based on what you sent with the application and only if a match with a potential supervisor/project is found.

As you can imagine, getting selected is *really hard*. During the 2019 call, only 40 students over *1660 applications* were chosen. I must admit that when I received the admission email I was both excited and incredulous. However, as you can see, it is not impossible!

## The First Steps



The view from my flat in Saint Genis (you can see the Alps in the background)

Our apartments were located in the small village of *Saint-Genis-Pouilly*, which is based in France, around 3 km from CERN (or 1.8641136 miles if you like). We were

hosted by *Séjours & Affaires Saint Genis* in some cosy 4-people flats. The hotel was in a central location, near all facilities: the supermarket, some *patisserie* (pastry shops), pharmacies and pubs. The place was also well served by buses which made reaching CERN and Geneva really easy (be aware that the tickets are *really expensive!*). I arrived on the weekend before the actual start of our contract to have some time to organize myself.

On our first day at CERN, a convenient bus was organized to bring all of us summer students from our accommodation to CERN. Here we got our personal badges and we met with our supervisors who introduced us to our projects (and to our *new offices!*).

We also attended an introductory meeting with the *openlab Summer Student team* where we got useful information for our stay. Moreover, some of us grabbed the bikes which became our trusty fellows for all the following nine weeks (they made the trip from the hotel to CERN way much more pleasant!).

I was assigned to the BioDynaMo project. It is a C++ large scale simulator which enables researchers to model complex biological systems, like pyramidal cells of the brain cortex or the growth of a tumour. It is developed at CERN together with *ETH* and *Newcastle University*. My project title was “**Improving BioDynaMo build system**”. I worked on enhancing the CMake procedure used by BioDynaMo to compile and install the entire framework. As you can see, it was not strictly related to physics. This is because CERN openlab is a private-public partnership between CERN and external companies. It is focused on the development of cutting-edge ICT solutions and therefore it covers many research areas besides computational physics.

## The Usual Day





CERN's Main Auditorium right before a Summer Student lecture

A classical day in the life of a summer student was structured like this (at least, it was this way for me). I used to wake up around 7:45 AM such to be able to reach the office around 9:00 AM. We had *8-hours working days*, from Monday to Friday. However, these timings were not so strict. Each group had its own schedule. I preferred to arrive at the office “early” anyway to make the most out of the day. After a quick breakfast, we used to bike to CERN (there was also a shuttle arranged for us, but I used it only a couple of times during rainy days).

Once arrived, everybody scattered towards their respective buildings. Usually, during the morning people used to work on their projects or attended some of the summer student physics lectures. The lessons were fascinating and covered many topics: for instance, we learned how CERN's detectors are made and how they handle the high throughput of data produced when the LHC is running. Moreover, we had more specific computer science lectures, specifically designed for openlab students, with topics ranging from *quantum computing* to *deep learning*. We also had some hands-on sessions (for example, we experimented *high-performance computing* with GPU).

Most of the lectures were recorded and are freely available online. You can see the entire openlab summer student program here.

Moreover, the Summer Student program was also full of several other activities which were open to us. For instance, I once participated in a really engaging workshop in which we built a *cloud chamber* to simulate one of the first particle detectors ever realized. It was really fun and all of us enjoyed it.

The Summer Student program is also freely available online (so as all of their lectures). Check out this link here.



Baby Plage, one of Geneva's beaches where we used to go swimming.

At around 12:00 we used to gather at one of the CERN's restaurants to have lunch all together (and maybe playing ping-pong outside). Sometimes we were so many that we literally occupied entire tables just for hosting all of us! CERN restaurants offered many different really high-quality meals, with dishes ranging from *sushi* to *Italian pasta* (if you will ever eat there, try the *Pasta di Giuseppe* from R1, it will be an unforgettable experience).

After the needed break, it was back to work again or back to the openlab lectures (with an essential coffee break during the afternoon). Most of us used to finish working around 18:00/18:30 and then the rest of the day was up to you. You could have gone back home (to do your laundry usually!) or you could have done some other activity. For instance, we used to organize trips to Geneva's lake for a *refreshing swim*! Geneva's lake is the perfect location to chill after a long day. There were several possible beaches in which to rest and have a good time. Personally, I would suggest *Baby-Plage*, which is a "pebble beach" near the *Jet d'eau*. It also has a grass area where you can lay down and just relax. During the weekend we used also to gather in some apartments to chat or in Saint Genis at the local pubs, *ÔBrasseur* and *Charly's*.

# The Lightning Talks



Yep, that's me during my final presentation.

On our last week, we had to show what we accomplished during the past two months by doing a *lightning talk* of 5 minutes. We prepared a short presentation which had to exhibit our contributions to our projects to the fellow openlab summer students and to the CERN staff members. Moreover, to make it more “juicy”, a jury was also organized such to select the best 5 talks.

Those five minutes were the peak of our work of the past weeks and I can say that they were a pretty exciting moment (and also a little stressful)! Talking about something which you personally built to a venue like CERN was surely an amazing and empowering experience.

P.S: if you want to see how a lightning talk looks like, check out my presentation which is freely available **here**! I did not manage to get selected among those 5, but I assure you it is worth to watch! ;)

***Obviously, it was not all work and no fun! If you want to hear more about the life of a Summer Student, stay tuned for the next part of this article!***

***I want to hear your opinions too! Feel free to leave a comment on this story or to contact me (I've always loved critiques ;) )!***