THE PARTICLE ACCELERATORS THAT COULD HAVE BEEN AND WERE NOT

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A brief memory and tribute to the noble and ancient art of throwing one element against another to see what the hell it contains or composes.

In 2008, the very noble, loyal and undefeated town of Bilbao and its surroundings competed with third parties to house a large scientific infrastructure called a spallation neutron source. Even despite its undefeated historic qualification, Sweden took the installation to the water, sorry, the cat. However, a creditable second place, the sub-headquarters, and a fruitful interest took root in Vizcaya. This interest is still valid, in line with the historical moment that the study of the matter in its most intimate conception is experiencing.

You can now forgive the hundreds, thousands, of people who work hard in this field, that we did not know anything about the intended machine. Excuse me that at the beginning we looked at the mega-structure as cows look at high-speed trains; with incomprehension, indifference and with a disdainful look, the result of astonishment.

It seems, however, that, in essence, the heart of the matter was trying to find out what matter is made of, through various procedures, but with the common denominator of accelerating different particles (small components, such as protons or neutrons).

In Bilbao, at the engineering school, they called a particle accelerator a very long corridor in which the components of the school (the students) ran at speed, colliding with each other. In it, it did not seem necessary to cool its surface to absolute zero (-273.15º C), as in the big ones, but the scratch and the change of class already made the students run at high speeds. They collided, but no one analyzed the effects.

Well, then we already had an accelerator in town. And not just one, but wherever you lived, you also had another, and at home. Perhaps he has thrown it away because it is already an obsolete device; the picture tube of your TV (or CRT for the friends of abbreviations). Yes, the old Telefunken® or the Grundig® whose purchase forced the house to be remortgaged in the eighties, hid an accelerator inside, a cathode ray tube. This device constantly fired a beam of electrons against the screen. An electron gun in my living room, and I don't know!

So hundreds, thousands, millions of accelerators had been around the world, for a long time. It is more since 1953 the Bevatron worked in California. With the name of the Heavy group, this accelerator allowed us to demonstrate the existence of antiparticles. Later came the Tevatron or the Large Hadron Collider in Geneva.

Thanks to them, not only has an arsenal of subatomic particles been discovered with increasingly salty names (pion, kaon, muon, meson -known in other ways-, charm quarks, flavor and a long etcetera), but they have allowed great advances in fields such as medicine, electronics, or astronomy.

They were so decisive in the mentioned areas that some designs were colossal in size. The Superconducting Supercollider was a project for the construction of an apparatus 87 km long in Texas (where everything is big, like in Bilbao) and that would reach great energetic levels. In 1993 the project was canceled after having built 23.5 km of the tunnel due to its very high cost. It was left as abandoned as the Bilbao amusement park, today and before, a frigid and desolate wasteland.

It has been recently when it has transpired that the USSR also had its giant project in the cold war. However, the collapse of the red giant meant that it was not completed and accelerated, worth the

expression, the defenestration of his brother Yanki. You know, in the Cold War, if a country put some cardboard missiles on an island, another really planted them; if one sent a dog (we mean Laika) into space, others sent a civilian. All this in constant competition.

After these years, thanks to the evolution of history or perhaps to sanity, the accelerators and their facilities are cooperative and international tasks, but equally large in size and with a large execution budget. Therefore, at this point, we wonder if the need to increase the power, investment and size of these technological monsters is the scientific panacea or perhaps it is convenient to build more and more small accelerators.

As for the size, which does matter but is not definitive, it seems that not even with brutal accelerators would it be possible to demonstrate incontestably (directly) string-like theories. He very graphically points out Hawking that not even with an accelerator the size of the solar system the required energies could be reached (Planck scale). Therefore, either we in Bilbao try again or we will have to look for methods of indirect observation.

Regarding the proliferation of small accelerators, I am going to allow myself to reproduce (copy come on, plagiarize) a reflection of one of those responsible for the astronomical observatory of the Bilbao engineering school. "*In the world there is a Hubble, and a dozen large telescopes, such as Roque de los Muchachos or Arecibo, but the discoveries are made by many of the small telescopes (a few meters) that scan the sky every day ".* Of course, it is to think about it. Furthermore, the data obtained from the great robotic monsters of physics must be analyzed by a host of collaborators.

Thus, our little project (ESS-Bilbao), and that of many others that there are in the world, complement, encourage and certify that accelerators are used for something more than just watching TV, which is not so bad either.

To know or see more.

- Brian Greene in his book The Elegant Universe (there is also a fantastic documentary)
- More recent and close, Alberto Casas. The LHC and the frontiers of physics.

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