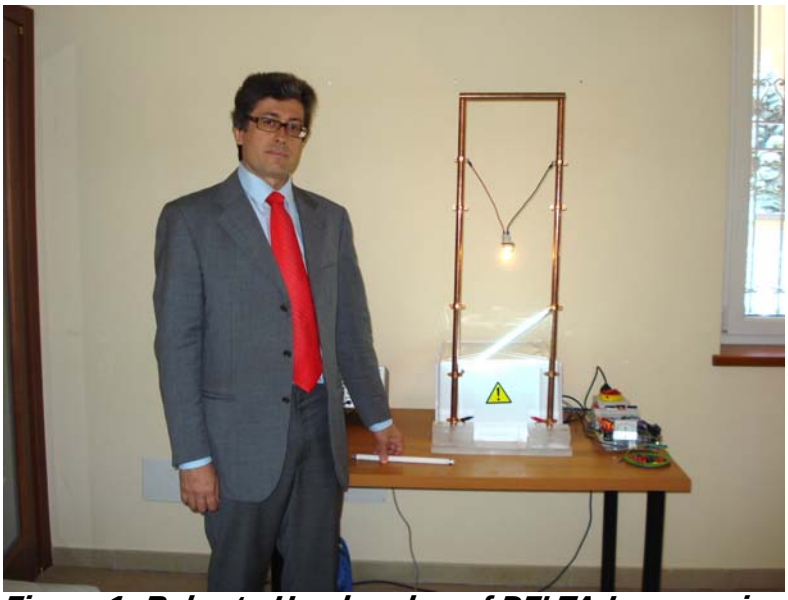
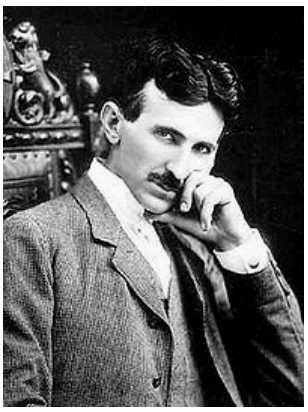
TESLA AND "COLD ELECTRICITY "

by Roberto Handwerker





Nikola Tesla

Figure 1: Roberto Handwerker of DELTA Ingegneria with the apparatus which replicates effects of Tesla's currents.

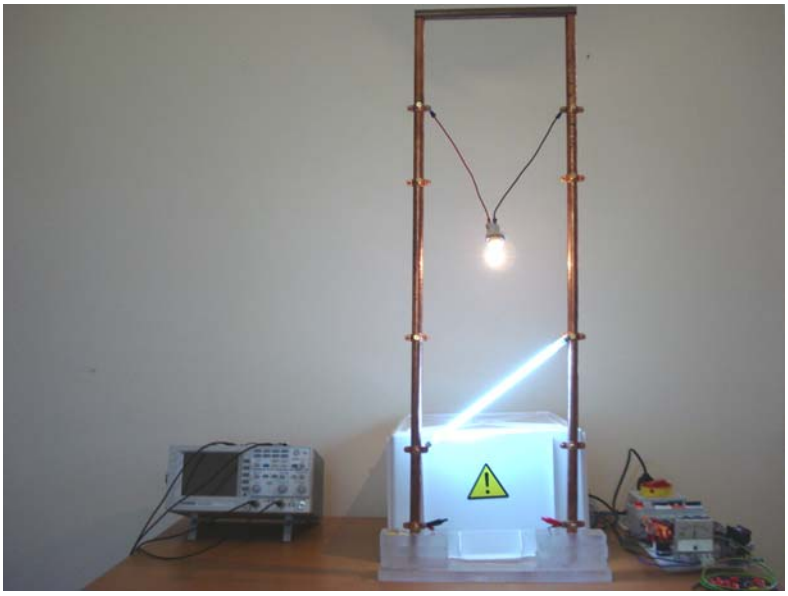
By the end of the nineteenth century Nikola Tesla published the results of his researches on electric currents and developed many inventions, among which are the AC motor, radio (till 1943 applied to Marconi) and the polyphase alternate system; later by forthcoming his studies and experiments he encountered new phenomena related to electric currents and was entirely involved in them, as long as he claimed it would be possible to transmit energy by only one wire instead of two as normally and, nevertheless, without wires i.e. "wireless". After the so called "war of currents" between Edison's DC people, at that time used in distribution mains, and people of today's Tesla polyphase system, his ideas and publications about "wireless" were investigated and ridiculed to the point that nowadays concepts such as "true wireless"[1] as himself called them or "cold electricity", are placed among "phantascience" and "free energy". Nowadays anybody who deals with these arguments, which are called "pseudosciences", risks to be ridiculed even if there are experiments and apparatus which show a number of "anomalies" in the behaviour of electrical currents on certain conditions and which only a few take care in acknowledge and verify: everyone who watch these curious phenomena is then compelled to demonstrate these to the scientific Community. As very few in the world could replicate, at least partially, the phenomena described by Tesla (what by the way happened already at Tesla's time, with his great frustration), it was concluded that they didn't exist. To further deepen the mystery came the consequently attitude of Tesla, who became prudent and enigmatic in publishing his discoveries just because of the scepticism of the scientific Community and especially of the plagiarism he had to suffer, which makes the comprehension of his theories harder. It is in fact impossible to replicate these phenomena if one doesn't deeply understand and share the principles which are the grounding of them and which the genius himself well observed but only partially illustrated, and even if one doesn't use the right means. Here was arbitrarily used the definition "cold electricity", which by the way came after Tesla, but whatever name will be

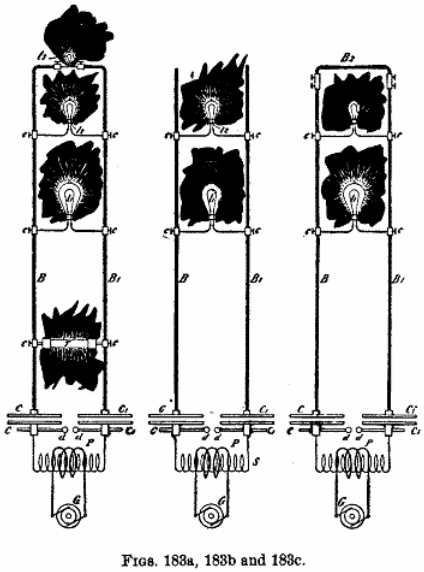
used one thing is true for shure: it differs much from the normal effects of electrical AC. Real phenomena are, for instance, normal incandescence lamps and neon tubes working at full bright even when short-circuited, halogen lamps working immersed in water, lamps having different voltage ratings working simultaneously on the same clamps and lamps working with only one wire or, by certain conditions, doing completely away with wires i.e. "wireless". It is therefore right to focus one fact: today not only anybody who is able to replicate such phenomena has to explain and demonstrate them, but even anyone who negate them saying they are impossible despite of evidence must justify by proves his position. The pictures relate to these curious phenomena.

Figure 2: Halogen lamp 230V/100W working immersed in water and confrontation with the same type of lamp working by monophase electric mains (household).

By a physics approach, it must be noted that Maxwell's equations which are the fundament of electromagnetism in their actual form doesn't match with the original version (which the great scientist intended to express by the complicate Hamilton's "quaternions") but were later "simplified" by Heaviside and Gibbs to their today's form, which instead of the 4-term quaternionic notation introduced the more simple (and different results-giving) 3-terms vectorial notation; for example, the sum of the two following vectors **v1**= a**i**+b**j**+c**k** and **v2**= -a**i**-b**j**-c**k** gives **v1**+**v2**= 0 but the sum of the two quaternions **q1**= a+b**i**+c**j**+d**k** and **q2**= a-b**i**-c**j**-d**k** gives **q1**+**q2**= 2a which is but a scalar not equal to 0 as it is for vectors. Moreover, vectors have the commutative property (**i**.**j**= **j**.**i**) on the contrary quaternions have the anticommutative property (**i**.**j**= -**j**.**i**) only to do an example. But even regarding the two well known expressions of Maxwell's equations (where **B** and **E** are respectively the magnetic and the dielectric vectorial fields):
B=∇ x **A** and **E**= - $\nabla\varphi$ - $\partial/\partial t$ **A** curiously enough, some of these values were always only considered mere mathematical abstractions and results of pure calculation rather that having a physical meaning such as the electric scalar potential φ and the electric vector potential **A**; also in this case, only very few took care to investigate this fact and, anyway, after long scientific debates all remained as it was i.e. undefined. But informatics seems to help now: even if calculation by quaternions is *per se* more complicated to do by hand than calculation by vectors, thanks to computers quaternions are being reconsidered, as calculation for computer graphics and aerospace navigation (for instance by inertial platforms) becomes greatly simplified and rapid by sparing up to 55% space memory in

computers[2]; so, if quaternions are very useful to informatics and space flight, maybe they could be even to electromagnetism in Maxwell's equations. But let us return to the mentioned phenomena: it can be stated that such "anomalous" currents ignore the circuit path which is normally more favourable to them i.e. is the one of less electrical resistance (that is the thick metal bars in the pictures) and prefer the most unfavourable path i.e. the one of greater electrical resistance (that is the lamp filament) against Ohm's Law V= R.I which evidently seems therefore not fully apply to this case. The pictures show some effects of "cold electricity", if one wants to call it that way, which is however possible to replicate and verify.





FIGS. 183a, 183b and 183c.

Tesla's 1893 original circuit[4]

Figure 3: incandescence lamp 12V/21W and neon tube 230V/8W without starter working short-circuited at same "clamps".

Tesla's theories and inventions about these themes were ridiculed without any respect towards the serbian genius who invented radio broadcast, alternate current, induction motors and much more, however it is noted that this applies very well to what the great philosopher Arthur Schopenhauer once said: *"Every truth passes through three stages: first, it is ridiculed; second, it is violently opposed; third, it is accepted as self-evident"*. The phenomena described by Nikola Tesla and from him *"curious phenomena"* [3] named, seem to make no exception to this rule: Nature hides still a lot of secrets and every time a new fact is unveiled clearly shows how much still to discover and understand is and how few, indeed, it is known; the horizon of knowledge spreads constantly to infinite, as obviously. Blind and pride is, to our opinion, the negation of what is (yet) not known: such point of view belongs to a non-scientific attitude which has to give way to a more open approach. Think for instance to the characteristics of the human body which are still today far from being totally known: this is even more true for the properties of Universe, and electromagnetism is no exception. In conclusion, some think that the ultimate target of Tesla and of his studies was wireless transmission of electric energy and even a more efficient way of producing energy in which he would have even succeeded, but as far as it is known this became part of the legend and mystery which surrounds his life. Anyway, our meaning is not to submit or impose this point of view to the scientific Community, but only to show the phenomena of these pictures people. For info e-mail to:

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[1] Nikola Tesla, "*The True Wireless",* Electrical Experimenter, May 1919.
[2] Roberto Handwerker et al. "*Rotazione di solidi mediante quaternioni"* , per Elementi di informatica-Facoltà di Ingegneria del Politecnico di Milano,1990 (*)
[3] Nikola Tesla, "*Experiments with alternate currents of very high frequency and their application to methods of artificial illumination"*, 1891.
[4] Nikola Tesla, "*On light and other high frequency phenomena"*, delivered before the Franklin Institute, Philadelphia, February 1893.

(*) i.e.: *"Rotation of solids by quaternions"* for Elements of Informatics - Milan Polytechnic - Faculty of Engineering, Milan, Italy, 1990.