

# The birth of a genius. 1905

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## ABSTRACT

This article is going to discuss the story behind of the creation and publication of the article entitled "*Zur Elektrodynamik bewegter Körper*" by Albert Einstein that took place in 1905. One can state that it was one of the most important articles in the history of science. A number of astounding coincidences associated with its publication are going to be considered. A theory explaining said events is also going to be presented.

## 1. Introduction

1905 was an extraordinary year in the history of science. On 30<sup>th</sup> of June 30, the editorial office of the German journal **Annalen der Physik** came into possession of Albert Einstein's work that was unknown to young physicists and entitled "*Zur Elektrodynamik bewegter Körper*" (On the electrodynamics of moving bodies) [1]. It turned out to be an exceptional work that laid the foundations of the Special Theory of Relativity (STR). Ten years later, in November 1915, Albert Einstein presented his works being the basis of the so-called General Theory of Relativity (GTR). Albert Einstein is widely recognized as a genius. Some consider Einstein to be the greatest scientist in history; others consider Einstein to be as brilliant as other exceptional scientists, namely: Isaac Newton, Galileo, or Archimedes. No one doubts that Albert Einstein was a brilliant mind that has had the greatest influence on the history of science and humanity.

The circumstances connected with the creation and publication of "*Zur Elektrodynamik bewegter Körper's*" work from 1905 are not well known by many. There were many amazing coincidences connected with the paper. The predominant purpose of this article is to analyze the creation of the Special Theory of Relativity (STR) through the prism of new publications that have appeared recently, in particular – books published by Russian physicist Anatoly

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Logunov, "HENRI POINCARÉ AND RELATIVITY THEORY" especially [2]. Professor A. A. Logunov was a theoretical physicist and an expert in the theory of relativity. A. Logunov's theoretical works may be considered to be controversial, but the aforementioned book is about STR and the story of its creation. The author focuses on the analysis and critical comparison of the works of Henri Poincaré and Albert Einstein. It is the work of a physics theoretician and historian of science. That is why it may be a difficult read for both humanists and physicists, although for various reasons. A. A. Logunov, basing on the original work, minutely analyzes who discovered the discussed phenomenon, who was first, as well as who was second. A. A. Logunov's work is a valuable and inspiring source of information for people who are well-versed in advanced mathematics and interested in the history of STR.

The Special and General Theories of Relativity (STR and GTR) are important today. Said theories were used outside the context of physics a long time ago. They have changed our view of the world, our understanding of time, space and matter. This article is an essay on the history of science, not a lecture on relativity. It is rather an attempt to explain a series of amazing coincidences connected with the creation of STR. The invention of GTR was also connected with some extraordinary circumstances, but it is a topic for a separate article. The main protagonist of the publication is Albert Einstein (1879 - 1955). Einstein was the author of over 300 scientific papers, but the Special Theory of Relativity and the generalization of general relativity are considered his most important scientific achievements. Both theories have brought Einstein an extraordinary fame as a scientist. Albert Einstein became a celebrity known worldwide, an icon of the twentieth century, included in numerous films, books, comics, as well as presented on T-shirts, cups, walls, etc. Most powerful people of his times respected his knowledge and opinion. The general opinion is that genius equals Einstein, whose characteristic feature was a full head of gray hair.

To complete the task, one has to go back to 1905 and the circumstances of the invention of STR, leaving a summary for later. It is not a story on physical theories, but on the people formulating them. The protagonists are geniuses, giants of science. Interestingly enough, people who are phenomenal mathematicians or physicists do not always reach moral heights. In everyday and professional matters, the so-called geniuses often do not differ from ordinary mortals, as they focus on reaching a specific goal by any means, including using convenient shortcuts. Let us move to 1905. It is called *Annus Mirabilis* - the wonderful year of Einstein. That year, A. Einstein published a number of outstanding scientific papers,

including the work explaining the photoelectric effect, Brown movements, his doctoral thesis (in fact, said work concerned the determination of the Avogadro constant), and the work entitled: "*Zur Elektrodynamik bewegter Körper*" [1] The same year, in another, later work, A. Einstein presented the most famous equation of modern science, namely:  $E = mc^2$  that is known even to individuals disgusted with mathematics or physics.

## **2. Before the storm**

The summer of 1905 was extremely hot. It was hot not only in a climatic and scientific sense, but also in the political one. During the summer of 1905, the political tension in Europe reached its boiling point with German-French antagonism increasing. In the Far East, there was the Russian-Japanese war, in the case of which Russian army was defeated during many a skirmish. Between May 25-27, within the borders of the Cuszimska Straits near Korea, a sea battle between the Tsarist Russia and Imperial Japan took place. The powerful Russian Baltic fleet, having sailed across a half the world: the North Sea, the Atlantic around Africa, (the British used the Suez Canal to allow for the movement of supply ships only), the Indian Ocean, and the South China Sea, found a peaceful destination at the bottom of Yellow Sea near the Korean island of Trush. The Japanese navy, during a great naval battle, sank almost the entire Russian fleet that was almost twice as numerous. Only two Russian ships survived, including the Aurora cruiser, which, twelve years later, on November 7, 1917 ... "the first shot fell ...", gave the sign to attack the Winter Palace and started the outbreak of the Bolshevik Revolution. Would not it be better if the Aurora also went down with other Russian ships?

News about the battle of Tsushima reached Europe very quickly, for there was a network of telegraphs entangling the entire world, causing a real shock, or rather a mental breakdown. For the first time, a great fleet of white power was sunk in an open sea battle by a fleet of small, oblong-eyed, colorful Japanese people! After the news of the defeat, a wave of revolts, riots and strikes that were later called the Revolution of 1905 broke out in Russia. The problems of Russia were a great opportunity for Germany. Russia, struck by defeat in the war against Japan and internal rebellions, was powerless. There was no way it would engage in a yet new war against Germany – to defend France. The French-Russian alliance started disappearing and with it disappeared the German fear of the necessity of fighting a war on two fronts. In political and military terms, the summer of 1905 was very memorable.

In the summer of 1905, France faced the threat of being attacked by imperial Germany. Prussia defeated France in the war of 1870-1871. It imposed enormous contributions and took away both Alsace and Lorraine. Nevertheless, France survived, was reborn, and was once again becoming a powerful country. In the summer of 1905, many German generals saw a chance to finish what had been started in 1871: the final defeat and vassalisation of France and the imposition of Germany's domination throughout Europe. The German general strongly urged Emperor Wilhelm II to start a preventive strike against France. Russia was paralyzed. Lonely France, without the help of Russia and Great Britain, would not defend itself against the power of German army. France was thought to must have fallen. Germany had to take advantage of a chance of a lifetime! Emperor Wilhelm II refused, however. In 1905, the war did not start. The German-French war would break out, but it would happen nine years later. The Great War would break out in the summer of 1914. We know it. Neither the inhabitants of France nor the Germans living in the dread and tension of that hot summer of 1905, could not have known that. Every day, they expected a salvo of guns to be heard near the Franco-German border, and millions of soldiers capturing Paris as it had been in 1871.

In 1905, imperial Germany reached the peak of its power and became the biggest industrial, economic, and military power in Europe. Germany had the strongest, well-trained, and decently armed army. The Germans were even engaged in the arms race at sea with Great Britain. The British fleet was in danger of losing control of the seas and oceans to the German fleet! The domination of Germans seemed unquestionable. German philosophy, poetry, and literature were exceptionally popular, similarly to music and opera. Throughout central Europe, from Strasbourg in the west to Lemberg (Lwow) in the east, from Tallin in the north to Trieste in the south, German language and German culture were dominant ones. Yet another field of German domination was science. German industry was flooding the world with first-class goods at attractive prices, producing the latest goods with the substantial support of science. Germany was slowly yet surely becoming world's science center. German science achievements were remarkable in all exact fields, such as: chemistry, physics, and mathematics. While taking a closer look at the list of mathematicians or physicists from that period, it is easy to notice that it is full of German names. The successes of Germans in science were the result of the introduction of a modern, universal education system: primary school, high school, and university. German universities were a class of their own; they were

the forge of future Nobel Prize winners. European educational centers were overshadowed by best German universities. American universities were not considered to be any competition at all at that point.

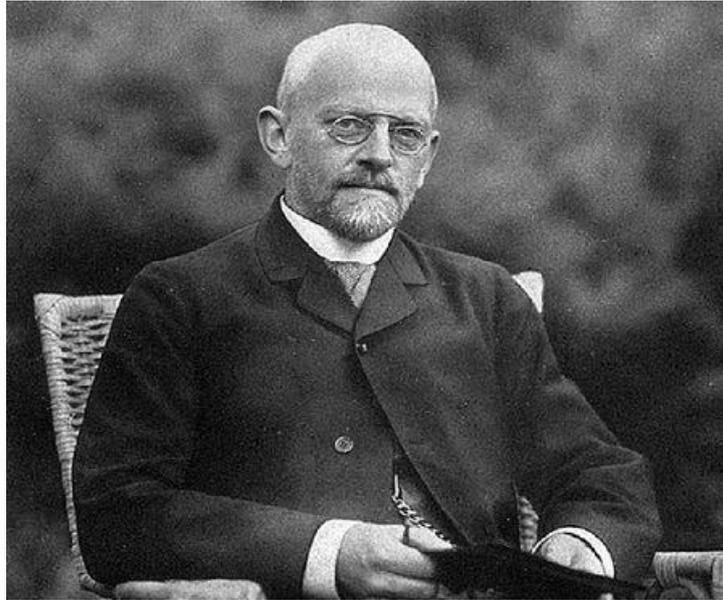
Germany reached the peak of its power during the summer of 1905. Later on, it was only worse - worse for Germany, of course. In the summer of 1905, it seemed that Germany could do everything to dominate all of Europe. If they were not masters of Europe and the world, they would soon be. It seemed to be just a matter of time. However, after the summer of 1905, time was no longer working in Germany's favor. From the top, every road led down. Russia would quickly recover from the defeat in the war with Japan and tighten its alliance with France, with which it would gain the acceptance of the United Kingdom, terrified of Germany's increasing power at sea. A new, young power would also be revealed: the United States. The coalition of the US, Russia, and Great Britain would break the power of Germany during the First and the Second World War. Instead of the expected victories, Germany would go from defeat to defeat. The German summit of the summer of 1905 and the bottom of its power - May 1945 - were only 40 years apart. It was just one or two generations. A teenage German applauded Emperor Wilhelm II in 1905 and reveled in German power and superiority. Forty years later, the defeated Germans found themselves under the occupation of the victorious powers and the daughters or granddaughters of the aforementioned then teenage German were raped in the ruins of Berlin by the sub-men of the east, the Soviet Red Army soldiers! So straight is the path from the peak of power to defeat and collapse.

From the point of view of German domination, Emperor Wilhelm II made a great mistake by rejecting the plan to attack France in 1905. Sometimes, blunt generals are right and lost opportunities can turn against those who turn them down. If Germany had attacked France in 1905, history would have made a different turn. Speaking of German brightness, one cannot forget about some flaws. They were like fog, thickening every year and every decade, until the Germans opted for to worst mass crimes unseen in Europe since the expansion of the Roman Empire and the invasion of the Mongols. The German way of life was gaining popularity. Their arrogance, the conviction of their own superiority, uniqueness, their own higher goals, would be the foundation of the theory of *Herrenvolk* (the nation of masters). In 1901/1902, a strike of Polish children in small town Września in the German province of Poznan took place. Polish children were beaten because they did not want to learn in German at school. It was a sinister omen that few people noticed and nobody understood.

The strike of Polish children was a protest against the German policy of Germanization. From the policy of denationalization, Germany moved to the policy of mass extermination of less valuable nations. From forced German education in schools to mass shootings. From hitting children at school for speaking Polish to mass gassing of sub-humans in gas chambers. Such a direction of development was taken by the Germans within 40 years. The mass extermination of Poles or Jews was not a coincidence or a historical fortune, as some tell us today. It was a decades-long process, consistently implemented by the German nation, the German state, and its leaders. Adolf Hitler, the Führer and Chancellor of the Third Reich was not the first, but the last one in the long line.

### **3. Hot summer**

Having said that, let us go back to science and the summer of 1905. German mathematics was considered to be the most developed in the world at that time. The Germans had many great mathematicians, with one of them being of special interest for us, namely - David Hilbert (1862 - 1943), a brilliant mathematician, then the professor of mathematics at the University of Göttingen. Georg-August-Universität Göttingen Georgiana, founded in 1735 by King George II, which was one of the most important universities in Germany at the time. Interestingly enough, it can be said that the first curator of this university was Gerlach Adolph von Münchhausen, was a relative of the famous protagonist of the "Adventures of Baron Münchhausen". What a lovely story. It has to be remembered, however that there were no jokes with Hilbert. Young people were attracted to Göttingen like flies are attracted to honey. At the beginning of the 20<sup>th</sup> century, young adepts of mathematics from all over the world were given a simple advice: "pack your things and get in touch with Göttingen" [3]. Studies under the supervision David Hilbert were a gateway to the Mathematical Olympus, to a great scientific career. Hilbert's problems, a list of 23 mathematical problems that Hilbert presented in 1900 at the International Conference of Mathematicians in Paris largely dominated the development of mathematics in the twentieth century. Hilbert was appreciated not only for his mathematical achievements, but also for his organizational talents. He was a great learning manager. He specified the direction of research, employment, and expenses. David Hilbert was called a God, or more modestly: the Emperor of German (and thus world) mathematics.



David Hilbert (1862 – 1943)

David Hilbert is typically depicted as a slim, elderly man with a gray beard and a sharp look. A bit nervous in appearance. He was extremely intelligent and malicious like a monkey. Hilbert paid for a great scientific successes with a great personal misfortune. David Hilbert, from Königsberg, married a merchant's daughter from said city in his youth. It was a happy, consistent marriage. They had one son. Unfortunately, their only son, Franz, was deeply mentally disabled. Franz Hilbert suffered from an undiagnosed mental illness. Having a mentally handicapped child is a remarkable disaster for every parent. For a man as intelligent and brilliant as Hilbert, it was a catastrophe with which he struggled until the end of his life [3].

In this Pangermann, a mathematical cask of honey, there is a spoonful of tar in the form of a French mathematician, Henri Poincaré (1854 - 1912). In old photos from this period, Henri Poincaré was a man with a thick, black beard and round face. One can easily notice that he liked good food, like a true Frenchman. When it comes to his appearance, he was a bit puffed. Poincaré probably thought that a university professor should be very respectful and admiring. The professor of mathematical physics at the University of the Sorbonne deserved respect, especially the professor called Henri Poincaré. Poincaré and Hilbert set the tone for the world mathematics during the discussed period. Hilbert and Poincaré personally could not stand one another. It was a deep, mutual reluctance. There were probably many reasons for such animosity between the great German person and the brilliant

Frenchman. Hilbert was a follower of the so-called "pure" mathematics, whereas Poincaré believed that the most important problems of mathematics were on the border between mathematics and physics. There he sought them, found them, and solved them, increasing his popularity among scholars. Poincaré was a mining engineer by profession, not a mathematician. The personal reluctance that linked or divided Hilbert and Poincaré was superimposed and strengthened by the growing German-French antagonism, also manifested in science and nationalism, which was also raging on both sides of the Franco-German border due to the threat of war. It was still the summer of 1905.



Henri Poincaré (1854 - 1912)

The most important scientific event of the summer of 1905 was the conference on the theory of electromagnetism held at the University of Göttingen from June 5 to August 1, 1905. The organizers of the conference were David Hilbert, Hermann Minkowski, and Emil Wiechert, monumental figures in the history of science. There had been many scientific conferences earlier, but the discussed one is especially worth remembering. It was one of the most

important academic conferences of the 20<sup>th</sup> century. The Göttingen Conference was purely **German**, only German mathematicians and physicists were invited to attend it. Poincaré who had been working on the theory of electromagnetism for years and who was the most eminent specialist in electromagnetism, had not been invited. Among the organizers, the most important one were David Hilbert and his colleague and friend - Hermann Minkowski (1864 - 1909) an outstanding mathematician, working on the theory of electromagnetism. Minkowski was a member of the family of Polish-Lithuanian Jews that moved to Königsberg. The conference was devoted to the most burning scientific problem, namely: What is light? Is the speed of light maximum? Is the speed of light the limiting speed? Is it possible to move at superluminal speeds? How does one explain the amazing results of the Michelson-Morley experiment?

In 1886, two American physicists, Michelson and Morley carried out an experiment. It turned out that the speed of light was constant, independent of the speed of the source. The result was contrary to everyday experience and common sense. Explanation of the results of the Michelson-Morley experiment became an urgent task of theoretical physics, because these results contradicted the obvious foundations of mechanics, for example patterns for adding speed. The said issue was the main topic of the conference at the University of Göttingen. How to approach the results of the Michelson-Morley experience? How to reconcile them with the basics of mechanics? What is Lorentz - Fitzgerald shortening? How to understand the works of Hendrik Lorentz from 1904 and his transformation patterns? The witness of those events was Max Born (1882 - 1970), later on - a prominent physicist, Nobel laureate of 1954 and a physics student in 1905. Max Born was a member of an assimilated German-Jewish family. Max Born will be our chronicler. A taciturn chronicler at that, for Max Born knew more than he told. Born recalled that he had spent many wonderful and intellectually stimulating hours during the lectures of Minkowski and Hilbert [2]. Listening to the lectures of people of such a scientific caliber must have been an extraordinary experience; a spiritual and intellectual feast. It was the beginning of June 1905. Nothing was decided yet. The problem had not been resolved. A special seminar on the movement with superluminal speeds was foreseen at the conference. Theoreticians were considering all available possibilities.



Hermann Minkowski (1864 - 1909)

Seminar at the Göttingen University, the true festival of German physics and mathematics, started on Monday, 5<sup>th</sup> June. Dates are important, for every day was of the essence then. After few days from the moment of Göttingen University seminar commencement, the information about the work of Henri Poincaré presented in Paris reached its participants. On 5<sup>th</sup> June in Paris, Henri Poincaré announced and published his work entitled: “Sur la dynamique de l’électron” [4]. It was not an accident that Poincaré presented the result of his works on the day of German conference in Göttingen. It was a mischievous gift of the Frenchman to his German colleagues. Poincaré hastily published a brief version of his results. Their full version was presented to a publishing house several days later. Back then, there was no Internet, TV, or even radio. However, people had phones, telegraphs, and a perfectly operating railroad system. Thanks to that, they found it exceptionally easy to share information with one another. Rumors about the work of Poincaré, together with the brief description of its content, reached Göttingen after few days. German scholars could not ignore the invention of the great French mathematician. Poincaré was the best specialist in the world in the field that was then known as the theory of electromagnetism. He had published many works touching upon the topic. Hilbert was not knowledgeable with regard to the theory of electromagnetism, but Minkowski could just briefly browse through the work to know that Poincaré had found the solution to the problem! The Frenchman defeated Germans in the field they had always been excelling in! It must have been a breakthrough. A complete shock and terror. It was the

humiliation of German science by a pompous Frenchman. The work of Poincaré [4] caused the majority of seminar materials sent to the Göttingen seminar to be irrelevant.

The full version of H. Poincaré's work reached an obscure Italian publishing house on June 23, 1905 [5]. Poincaré, despite his scientific position, had no special choice if he wanted to publish his work quickly. As a French patriot, he wrote in French only. German magazines were out of his reach. A week later, on 30 June 1905, the German scientific journal **Annalen der Physik** was influenced by the work of a young, then unknown scientist, Albert Einstein entitled: "*Zur Elektrodynamik bewegter Körper*" [1]. It became the basis of the entire new branch of physics: the Special Theory of Relativity. Let us take a closer look at these, indeed amazing, coincidences:

1. June 5 - **French** mathematician H. Poincaré announced the results of his works in Paris [4].
2. June 5 - conference at the University of Göttingen began, bringing together the most eminent **German** specialists in the theory of electromagnetism, the feast of German science.
3. June 23 - full version of H. Poincaré's work reached a little-known publisher in Sicily [5];
4. June 30 - work of the young **German** physicist A. Einstein "*Zur Elektrodynamik bewegter Körper*" reached the **Annalen der Physik**.
5. Einstein's work was accepted without corrections and quickly published.
6. January 1906 - publication of the full version of H. Poincaré's paper [5].

Were Poincaré and Einstein's works independent? Did Einstein read Poincaré's paper from June 5? Einstein denied it till the end of his life. Did Einstein know about other works on the theory of electromagnetism, in particular - the work of Hendrik Lorentz from the previous year, in which Lorentz had derived the famous transformational patterns? He did not mention him in the bibliography, there is no bibliography at all. Einstein insisted that he had not read Lorentz's work. Were there anything that connected Poincaré and Einstein papers? It seems that the element connecting the work of Poincaré with "*Zur Elektrodynamik ...*" was the conference in Göttingen. Poincaré had sped up the announcement of his results so that he could start the Hilbert conference in Göttingen. When did Einstein enter in this story? At that time, Albert Einstein lived in Bern, worked in a patent office, wrote scientific papers on thermodynamics and prepared to defend his doctoral thesis. He had just finished and sent very important articles about the photoelectric effect (March) and Brownian movements (May) to the editorial office. Max Born wrote that during the lectures of Minkowski and Hilbert during

the memorable seminar in Göttingen, Einstein's name was not even mentioned [2]. Einstein appeared quite unexpectedly, like a rabbit pulled out of a hat. If Einstein had previously worked on the theory of electromagnetism and obtained such amazing results, why did not he present them at the Göttingen conference? For the young **German** physicist, the Göttingen conference was the perfect place to announce his results. It was a dream-like chance to shine for a young, ambitious **German** scientist.

Let us now focus on the work itself: "*Zur Elektrodynamik bewegter Körper*". It is an excellent scientific work, rightly considered to be in top 10 of most important works in the history of science. It focuses on theoretical physics, so understanding it requires a careful mathematical preparation. The derivations are simple and convincing, the course of reasoning is impeccable. However, it contains some errors, perhaps because it was written in a hurry. An article is written in a heavy style typical of Einstein. The author of this work had to be an excellent mathematician with a deep knowledge of the theory of electromagnetism. It is difficult to find any flaws of except of one: the work contains no bibliography. At the end, there are only partial thank-yous for a man named M. Besso. There are no references to literature whatsoever, no bibliography. It was typical of Einstein. Many of his works lack bibliographies. It seemed that the author discovered everything himself, he came to every conclusion by himself. Nevertheless, it was not so and we know it.

When I was studying STR as a student, I was surprised that transformation patterns were called Lorentz, not Einstein ones. If Einstein had discovered and everything by himself, why did not give them his name? Hendrik Lorentz, a Dutch physicist, presented these patterns in a work published in 1904, but misinterpreted them. The meaning of the Lorentz transformation was fully understood by H. Poincarè and it was Poincarè who gave them the name of the discoverer. In his work, Einstein did not mention the work of Lorentz presented the previous year, even though he should have known about it. At that time, Albert Einstein made a living by publishing reviews and summaries of scientific papers in the **Beiblätter Annalen der Physik** journal. The summary of Lorentz's work appeared in volume 4 out of 24 in March, May(?) 1905 [2]. How come Einstein, a young scientist obsessed about relativity, did not get acquainted with the fundamental work of Lorentz, since he had access to the journal and studied the published articles in terms of his scientific work as well? There are two possibilities. Einstein told the truth and did not read Lorentz's work, which means he was not the author of "*Zur Elektrodynamik bewegter Körper*". Einstein could also have read the

work of Loentz. If so, why did not he put it in a bibliography? What other items are missing in the non-existing bibliography of "*Zur Elektrodynamik ...*"?

The course of events starting from June 1905 was astounding. Usually, historians of science argue that it was an accidental course of events and that these events were not related in any way. In accordance to the generally applicable version, Poincaré published his works in Paris, and in Bern, Switzerland, a young genius Albert Einstein, without any knowledge of other works, in isolation from the scientific world, wrote the "*Zur Elektrodynamik bewegter Körper*". It does not matter for the scientists that the conference on the theory of electromagnetism was taking place in Göttingen at that time. Einstein said that when he wrote his work, he only knew Lorentz's articles from ten years ago and Poincaré's work from five years ago. Here is the version of Einstein and his apologists: young Einstein went to Bern on a tram to or from work and thought about what would have happened if a man ran at the speed of light in a tram moving at the speed of light. Einstein thought about that so long that he invented the Special Relativity. The only creator of STR would then be Albert Einstein.

What does H. Poincaré's work, published earlier than the Einstein's one, contain? This question was answered by A. A. Logunov, who went to trouble of reaching the original works of H. Poincaré and H. Lorentz. A. A. Logunov also critically compared them with Einstein's work. STR consists of two parts: assumptions or postulates, that are currently called Einstein's postulates and a theoretical part - calculations resulting from these assumptions, including Lorentz transform. The postulates of STR, or Einstein's postulates are as follows: 1) all inertial systems are equivalent to each other and 2) the speed of light is the maximum speed. These postulates are considered to be the revolutionary contribution of Albert Einstein. The first postulate is nothing more than the renewed principle of Galileo. The second postulate is the conclusion of Michelson's - Morley's experiment. Both postulates can be found in the works of H. Poincaré from 1904 and 1905, as shown by A. Logunov [2]. Therefore, these are not Einstein's postulates but Poincaré's. Henri Poincaré solved the problem first! Incidentally, in the work "*Zur Elektrodynamik...*", the famous Einstein formula was derived:  $E = mc^2$ , but with an error. The correct form of the formula was provided by Einstein in the next work published after a few months. The equation was also the first to be derived by Poincaré [2]. The most famous physics pattern should be called Poincaré–Einstein equation, or even Poincaré equation.

Is Einstein's article not original, but rather a secondary one to Poincaré's work? Was Henri Poincaré the factual creator of the Special Theory of Relativity? Is the situation even worse for Einstein? There are three explanations for the strange coincidences of June 1905. The first one is the traditional version: Einstein himself wrote his work without reading the works of Lorentz and Poincaré. The date-specific similarity between the publication of Einstein's work and the publication of Poincaré's works was a coincidence. The Göttingen conference had no connection with the discussed events. The second possibility is that Einstein got acquainted with the works of Poincaré and Lorentz and his work was written in a hurry as it had been ordered by the participants of the seminar in Göttingen: David Hilbert and/or Hermann Minkowski, and was quickly accepted for publication in order to precede the publication of H. Poincaré's works. If that was the case, then the work "*Zur Elektrodynamik bewegter Körper*" from 1905 would be plagiarized. Finally, the third possibility is the most radical one.

Was the "*Zur Elektrodynamik bewegter Körper*" paper written by Einstein at all? Was Einstein able to write a thesis on an expert level in a field that was completely unknown to him? Max Born called Einstein a "*mathematical ignorant*" [2], even though he met him when Einstein was already at a much more advanced level of mathematics. At that time, Einstein was deeply involved in thermodynamics. The transition from thermodynamics to electrodynamics was a huge leap that would have required many months of intense work. Did Einstein have the time to do it in the summer of 1905? The answer to this question is usually that he could do such a thing for he was a genius. It is possible, but days have 24 hours for geniuses as well. Einstein spent eight hours at work. In his spare time, he was involved in intensive scientific work: he wrote and published works on thermodynamics. "*Between 1902 and 1904, Einstein wrote several articles on thermodynamics that were very similar to previous Gibbs' works, without any reference provided. The similarity is amazing*" (Max Born) [2]. In 1905, Einstein also wrote a paper on the photoelectric effect. He also wrote a doctoral dissertation which was paramount for his future career. Would Einstein, with such a tight schedule, find time to start working on the theory of electromagnetism from scratch? This theory had not been taught at universities. It was perhaps dealt with by 20, 30 scientists across the entire Europe

So, what happened? A copy of Poincaré's work from Paris reached Göttingen one week later, around 12<sup>th</sup> June. It was read by Hilbert and Minkowski. Hilbert understood little

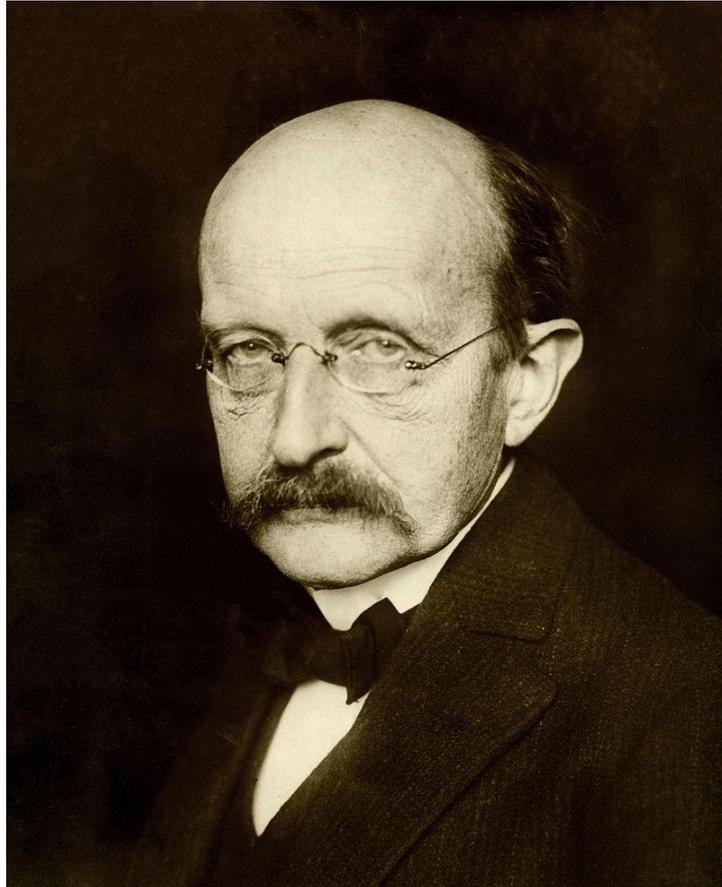
of it, for he was not a specialist in the theory of electromagnetism, but Minkowski immediately grasped the importance of the Poincaré's discovery. After Poincaré's article, the Göttingen conference became unnecessary and many of the presented materials were ridiculous. Poincaré publicly ridiculed German physicists and mathematicians on their feast day. The insult had to be answered. Hilbert (?) or Minkowski (?) came up with an idea to ridicule the conceited Frenchman. The Poincaré's article could not be ignored. However, could one write one's own article on the basis of Poincaré's results? Such a scenario is a bit similar to novels by Agatha Christie. A body was found in a closed room. A murder was committed. No witnesses were found. Who committed the crime? Who wrote this article?

It seems that in May, 1905 Einstein was unable to write the article "*Zur Elektrodynamik bewegter Körper*". Between sending the work to Brownian motion (May) and sending the work "*Zur Elektrodynamik...*" (June 30), only two months passed. Within two months, Einstein would have to learn a whole new theory and write a groundbreaking paper! Two months and two, or three hours of work a day between dinner and sleep and a new, revolutionary theory is ready? For comparison, Henri Poincaré, who did not lack mathematical talent or enthusiasm for work, worked on the theory of electromagnetism for 15 years. In the summer of 1905, Einstein had neither the time nor deep knowledge of the theory of electromagnetism to write such an article. If not Einstein wrote the paper, then who did it? The two main suspects are: Hilbert and Minkowski. It seems that Hilbert would have to be excluded. He did not deal with the theory of electromagnetism, he would have to make up a lot. Besides, why would he do it himself and take a risk by himself? The author of "*Zur Elektrodynamik...*" was a person who a) was a great mathematician, b) knew the theory of magnetism exceptionally well, c) was at the conference in Göttingen, and d) whom Hilbert could trust. The idea was very risky. It was the plagiarism of an article by a famous scientist. All these criteria are met by one person: Herman Minkowski, a close associate and friend of Hilbert. Hilbert called Minkowski his best friend.

Hilbert trusted Minkowski. One could say that Minkowski was seen at the crime scene with a smoking gun in his hand. Minkowski had the motive: he was a German Jew and he wanted a career in German science, and the German scientist, Hilbert especially, were very keen to humiliate the smart Frenchman. Minkowski had the opportunity: he knew the theory of electromagnetism very well. Minkowski was at the crime scene at the Göttingen conference and he was a great mathematician. In a court scenario, would Hermann

Minkowski be found guilty of the most important fraud in the history of science? It was a fraud and it was not at the same time, because then, he would be the author of an outstanding, groundbreaking scientific work. The article is great, mathematically perfect, so its author was an excellent mathematician. It is not a simple job to rewrite someone else's work. Contemporary plagiarists use the copy and paste. They are dull, lazy and have computers. At the time, there were no computers, and Hilbert and Minkowski were too intelligent to commit such an outright plagiarism. The work "*Zur Elektrodynamik bewegter Körper*" is a plagiarism of ideas. The author, knowing the results obtained by Poincaré, reached identical conclusions in a mathematically different way. Not even a single sentence is repeated in both works. The author deeply thought about it, processed it, and looked at the topic from a different angle. Minkowski with his knowledge and mathematical talent could write such an article in a week or two, although it cannot be proved. It is only a speculation.

Minkowski could write the article, but he did not dare to publish it under his own name. In the event of a setback, the consequences would be monstrous. At the time, concepts such as honor and honesty were treated very seriously in life and in science. In the event of the detection of plagiarism, his author would not only suffer from scientific exclusion, but would also be excluded from the world science as such. It happened that people committed suicide due to such a degradation. Minkowski did not want and could not risk his scientific career by performing such a shady undertaking. He had to find someone who had nothing to lose, who would sign the article with his name, and therefore - take the risk. Einstein entered the scene at that point. Einstein was a student of Minkowski in 1896-1900. Minkowski did not value Einstein, but he remembered him. Einstein was a Jew, so Minkowski could trust him. Einstein was determined to make a career in science by all means possible. Einstein was considered to be a scientist not very sensitive to the originality of his articles, as it was noted by Max Born. Einstein was the ideal candidate to become the author.



Max Planck (1858-1947)

If that was the case, Minkowski probably regretted his decision till the end of his life. At the end of June, the article "*Zur Elektrodynamik bewegter Körper*" was ready and signed with the name of Albert Einstein. Another obstacle was overcome. One more man was needed for the plan to succeed. The article must have been quickly received and printed. One man could provide it - Max Planck, a great German physicist, who was at that time the editor-in-chief of **Annalen der Physik**, the most important scientific journal in the country. In 1905, **Annalen der Physik** was like Nature and Science - two most prominent contemporary scientific journals - put together. Hilbert and Minkowski knew all too well that Poincaré would finish work and send the article to the editorial team any day. A quick publication was very important, but yet another matter was equally important. It was necessary to make Poincaré's article go unnoticed. No reviews, and of course no reprints in German scientific magazines could be made. The plan was concluded. The name of Poincaré disappeared from German magazines, there were no reviews of his groundbreaking works as well. H. Poincaré's articles

on the theory of electromagnetism were forgotten almost entirely. Scientists returned to analyzing them 50 or 60 years later.

Many think that it is impossible that Max Planck, being famous for his honesty, strict morals, and discipline, could participate in such a scientific deception. Max Planck was an extremely honest man and scientist. However, Max Planck had two sons. During the First World War, the elder son of Max Planck died in the battle of Verdun, the second got into French captivity. Children learn to love their homeland at home. Max Planck would never agree to participate in a fraud for his own benefit, but being a **German** physicist in that intensely nationalistic period of the summer of 1905, he could have not gone for such a deal for the sake of German science.

Everything went according to plan. Hilbert and Minkowski managed better than they had dared to dream, but not exactly as they planned. Let us check the calendar. As of now everything fits perfectly. On the fifth of June, Henri Poincaré published the main theses of his work. After a week, around 12<sup>th</sup> Minkowski (probably) began to write his article, which was ready after the 20<sup>th</sup>. Einstein agreed to write an article, but he imposed his own terms. Einstein was not stupid and did not want to sign something uncertain. Perhaps Einstein and Minkowski met stealthily, e.g. in Zurich. From Göttingen to Zurich, there are only a few hours by train and Einstein was often in Zurich. He defended his doctoral thesis at the University of Zurich. Einstein and Minkowski spent a day or two locked in a hotel room. There, Einstein edited the work to be in accordance with his style and Minkowski tutored him on the theory of relativity, so that Einstein could say something about it. On June 30, the work of Albert Einstein, titled "*Zur Elektrodynamik bewegter Körper*" was reached by publisher. If that were the case, then the work "*Zur Elektrodynamik bewegter Körper*" would be a double deception or a squared fraud. Not only would it be a plagiarism, it would also be published by a false author. Lies attract other lies.

Is this a fantasy? Slander? Bending facts and circumstances to fit the preconceived thesis? Is it not much more of a fantastic story than the one about a young man who made a fundamental breakthrough in science? He invented a new theory by riding a streetcar and thinking about the speed of light in an hour or two in a day? There is no other such a wonderful case of genius in the history of science. Henri Poincaré, a genius mathematician was writing his groundbreaking work starting after 15 years work. Isaac Newton, before he published *Philosophiae naturalis principia mathematica*, also worked on it for many years.

The case was similar with other great scholars. In this case, we are talking about an almost instant discovery. If that were true, then Albert Einstein would not be one of geniuses, but for the genius among geniuses.

#### 4. After the battle

Everything went perfectly. The article entitled "*Zur Elektrodynamik bewegter Körper*" by Albert Einstein (?) was published in **Annalen der Physik** and became a great scientific event. Henri Poincaré's article "*Sur la dynamique de l'électron*" [5] published in its full version in January 1906 passed unnoticed and was soon forgotten. It was a complete success. The plan went perfectly, however Minkowski and Hilbert lost. Hilbert and Minkowski suffered the biggest failure in their professional lives. Minkowski's and Hilbert's mistake was that they underestimated the meaning of the article. They did not think that the mischievous trick they pulled off was also one of the most important articles in the history of the science. They thought that nobody would care about the scientific article in theoretical physics stating that the highest possible speed is the speed of light?

If he had predicted it, Herman Minkowski would have published said article under his own name, regardless of the threat of accusation of plagiarism. In the following years, Minkowski worked frantically in the field of relativity theory. He created a beautiful, geometric, space-time interpretation of the theory of relativity. Was his subsequent, unusual activity in the field of relativity supposed to cover this terrible mistake, which was the assignment of Einstein as the author of his most important scientific work? "*Ach, der Einstein,*" Minkowski said ruefully, "*der schwänzte immer die Vorlesungen - dem hätte ich das gar nicht zugetraut.*" (Oh, that Einstein, always missing lectures - I really would not have believed him capable of it!) [3]. Einstein did not do homework, did not read the works of Poincaré, but Minkowski read them. If Einstein did not write it, then who did? Minkowski admitted to writing the work. Minkowski felt cheated and it is hard to be surprised by the fact that it was him. Hermann Minkowski, who cheated himself, could only feel like that if he was the author of the work "*Zur Elektrodynamik...*" Other characteristic words of Minkowski were as follows: „Einstein's presentation of his deep theory is mathematically awkward - I can say that because he got his mathematical education in Zurich from me” [3]. Those words, can be considered to be at least ambiguous. He probably meant tutoring on relativity in a hotel (?) in

Zurich, when he was frantically working with Einstein on the article "*Zur Elektrodynamik bewegter Körper*" to send it to **Annalen der Physik** as soon as possible.

Herman Minkowski felt hurt, cheated, and fooled. His best scientific work was ascribed to another scientist. Minkowski felt like he had thrown a dead hen across a neighbor's fence. The hen not only came to life, but it also began to lay golden eggs for the neighbor. It must be difficult to accept that your best job brings fame to other, stupid, and less talented people. Hermann Minkowski died four years later in 1909, aged only 45, due to acute appendicitis. Doctors said that the mental attitude of the patient was of great importance in the course of the disease. In 1909, Einstein's work was already famous in the world of science and Minkowski was still a little-known associate of David Hilbert. At the funeral of Minkowski, Hilbert delivered a beautiful and moving speech about his best friend. He never forgot about Minkowski's injury and he did not forgive Einstein. Time favored Einstein. In 1912, Poincaré died, who felt sorry for Einstein for the rest of his life.

Was Albert Einstein the author of the article "*Zur Elektrodynamik bewegter Körper*"? Or was it a plagiarism of the work of Poincaré, and the author of said plagiarism was Herman Minkowski? One person except Einstein knew the answer – it was the first wife of Einstein Milena Marić. Milena was with Einstein that summer of 1905. Einstein met her during her studies. They lived with each other, but they married in 1903. Eleven years later, they were separated and in 1919 they divorced. At the time, Einstein was the star of science; he replaced Max Planck himself as the chairman of the German Physical Society. Albert and Milena had two sons, one of whom suffered from a mental illness and required constant medical care. Einstein, who was very clever, did not fail to use the shared difficult experiences (mentally handicapped sons) to tighten his relationship with David Hilbert. Milena was a good wife for a poor student or a beginner scientist. When Einstein became famous and rich, Albert exchanged Milena for a new, younger, better model, with the right origin. He married his cousin Elisa, a Jewess. Milena was a Serb, a gentile. The divorce conditions were greatly magnanimous. Einstein was supposed to pay for the maintenance of Milena and the childrens, deposit a large sum in the bank for Milena to use, and finally pay money from the Nobel Prize won to her.

Einstein was frugal, even stingy, how generous! Did Einstein pay Milena for silence? Milena was silent. She did not speak about her famous former husband until the end of her life. She did not say anything: neither good nor bad. What a strange behavior. Milena

must have been furious at Einstein, who threw her away like an old piece of furniture. Why did not she tell the truth about the exorbitant husband and relieve herself? If Einstein wrote "*Zur Elektrodynamik...*", why was Milena silent? Maybe she could not tell the truth and she did not want to lie? Silence has its own meaning. Did Milena know something about Einstein and it filled her with such a disgust that she could not talk about him? Milena certainly knew if her husband, Albert Einstein, had written the discussed work. She knew more than expected. I am convinced that it was Einstein who forced her to give her first child, an illegitimate daughter, to strangers, even though she blamed it on herself. Without a doubt: money from the Nobel Prize given to Albert Einstein was then paid to Milena.

There is a persistent rumor about Milena that she could be the author of "*Zur Elektrodynamik...*". A nice idea in the era of feminism. Milena Marić studied physics, she met Einstein during her studies, but she did not pass the final exams and did not have any contact with science, except for her life with Albert Einstein. The thought that even a physics graduate without many years of scientific training is able to write an article like "*Zur Elektrodynamik...*" is ridiculous. All one has to do is to browse through this work. Milena might as well have written a treaty on Buddhism in Sanskrit. It would be equally easy for a weekend runner to win a marathon at the Olympics. However, the persistence of this rumor shows how many people do not believe in the vision of a genius in the streetcar.

The question remains: who is the creator of the Special Theory of Relativity? Max Born is worth mentioning here, for he was the witness of discussed events. Max Born wrote that "Lorentz, Poincare, Einstein, Minkowski" [2]. It is worth paying attention to the order. Einstein is mentioned here as the third, but before Minkowski. Max Born knew more than he wrote. It is also possible that he did not write everything he knew.

This story would probably not have happened if it was not for a special time and place. The summer of 1905, huge political and military tension, the threat of war outbreak, and fluctuating nationalistic moods on both sides of the Franco-German border. Even geniuses scientists, and seemingly rational minds, such David Hilbert and Max Planck sometimes succumbed to madness or eclipse of the mind. If people like Planck or Hilbert had gone to scientific deception, is it a surprise that their students and doctoral students in black SS uniforms commanded firing squads or transported people to the gas chambers? Everything

was done for the great Germany. If it had not been for the reluctance and long-term rivalry between Henri Poincaré and David Hilbert... They both lost.

The heaviest defeat was suffered by Herman Minkowski, the alleged author of the work. Minkowski was consumed by grief and could observe Einstein's fruitfulness. He lost to Poincaré, whose relativity work was forgotten for over half a century. In a sense, it must have happened. Henri Poincaré was a French patriot, he wrote and published only in French when the language of science was German. After 1933, it became English. The language in which one writes is important. The Anglo-Saxons can learn German, though with difficulty, because it is a Germanic language, but learning French is usually above their capabilities. That is why the negligence of the works of Henri Poincaré that started in 1905 lasted so long. David Hilbert won that battle in some ways. He pushed Poincaré away from the spotlight, took away his discovery, defended German science, and gained a new, young "friend" - Albert Einstein. A common secret binds stronger than the marital oath. Does Hilbert won or lost – it depends. Ten years later, Hilbert would learn the idea behind the saying of a snake bred in one's own womb. Hilbert's defeat would be discussed in the context of the emergence of the General Theory of Relativity. He lost to Poincaré, lost to Hilbert.

There could be only one winner of the hot summer of 1905. The winner was one: Albert Einstein. The year 1905 is considered to be the year when a genius was born. The most brilliant man in history.

## References

1. A. Einstein „Zur Elektrodynamik bewegter Körper” Annalen der Physik.17:891, 1905, [http://users.physik.fu-berlin.de/~kleinert/files/1905\\_17\\_891-921.pdf](http://users.physik.fu-berlin.de/~kleinert/files/1905_17_891-921.pdf)  
„On the electrodynamics of moving bodies”,  
<https://www.fourmilab.ch/etexts/einstein/specrel/specrel.pdf>
2. A. A. Logunov, „HENRI POINCARÉ AND RELATIVITY THEORY”,  
<http://arxiv.org/abs/physics/0408077>
3. Constance Reid, “Hilbert”, 1996 Springer
4. H. Poincaré “Sur la dynamique de l'électron”. Compte rendus de l'Académie des Sciences de Paris, 140, pages 1504–1508. June 5, 1905.
5. H. Poincaré “Sur la dynamique de l'électron”. Rendiconti del circolo matematico di Palermo, 21, pages 129–175, received July 23, 1905, published in January 1906.