

## 7<sup>th</sup> International Scientific Technical Conference in the Area of Defensive Technologies OTEH 2016

Miroslav Jandrić<sup>1)</sup>  
Elida Vasiljević<sup>1)</sup>

The paper describes the activities of the seventh scientific conference of researchers who are engaged in defensive technologies, which was organized by the Military Technical Institute and held in October 06-07, 2016, in Belgrade. After the general presentation of this event, which was dedicated to the Serbian mathematician Mileva Marić-Einstein, some of 134 accepted papers, which admittedly attracted the most interest, were presented

**T**RADITIONALLY, at the beginning of October, in Belgrade, SERBIA, the Military Technical Institute (VTI) held the International scientific-technical conference in the area of defensive technologies OTEH 2016 for the seventh time. As well as in previous years, the organizer of this scientific conference was VTI, a scientific research institution with almost seventy years (founded in 1948) of tradition in development of weaponry and military equipment. By now the Institute developed and adopted around 1300 combat and non-combat systems into the operational use with which, together with the Serbian Army, many foreign armies are equipped as well. The most famous systems developed by VTI are: JASTREB, GALEB, ORAO, SUPER GALEB G-4M aircraft, M-84 tank, BVP M-80 infantry combat vehicle,

ORKAN, OGANJ, PLAMEN, MORAVA rocket systems, STRELA-10M2J self-propelled anti-aircraft rocket system, NORA gun-howitzer etc.

OTEH is a highly important international scientific-technical manifestation which is regularly held every second year and which comprehensively and multidisciplinary considers current situation and further development trends in the area of military technical sciences. During two days of conference duration a great number of quality and authentic papers was presented, which originated out of the current projects researchers are working on, as well as the papers which already have a practical use or at least refer to assumptions and further development trends of certain military technologies areas.



**OTEH2016**  
MILITARY TECHNICAL INSTITUTE



7<sup>th</sup> International Scientific Conference  
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Mileva Marić (1875-1948)

<sup>1)</sup> Military Technical Institute (VTI), Ratka Resanovića 1, 11132 Belgrade, SERBIA  
Correspondence to: Miroslav Jandrić; e-mail: jami953@yahoo.com

This year OTEH was attended by 507 authors and coauthors from 15 countries (Serbia, Russia, Algeria, Belarus, Israel, USA, Canada, Switzerland, Bulgaria, United Arab Emirates, Czech Republic, Great Britain, FYROM, Bosnia and Herzegovina, Slovenia). The presentation of 134 papers in sessions was preceded by three introductory lectures. All papers were reviewed and presented in some of the following eight topic areas:

- Aerodynamics and Flight Dynamics,
- Aircraft,
- Weapon Systems and Combat Vehicles,
- Ammunition and Energetic Materials,
- Integrated Sensor Systems and Robotic Systems,
- Telecommunication and Information Systems,
- Materials Technologies and CBRN Protection and
- Quality Standardization Metrology Maintenance and Exploitation.

The tone to this year's conference was given by the introductory lectures. Firstly, Professor Evgeny V. Sudov, PhD, from the Russian Research Development Center "Applied Logistics", introduced the Russian approach to maintenance of the combat technology and the ways of reducing the costs of its use. The second introductory lecture was given by Slobodan Rajić from American "Oak Ridge National Laboratory", and it referred to development trends of all contemporary technologies that are used during the development of own weaponry.



Lecture on Mileva Marić Einstein held by Professor Velimir Abramović

It is a long time practice that OTEH conference is dedicated to some of the Serbian and world's scientists who bound the world with their scientific achievements in the area of science and technical science. This year, in the third introductory lecture, Professor Velimir Abramović, PhD, introduced the mathematician and physicist Mileva Marić-Einstein to the audience. It was a kind of homage to her life and work. Also, together with this presentation of the scientific conference OTEH 2016 in the Scientific Technical Review journal, whose editor is VTI, we will try to discover and present a very specific scientific contribution to the technology world of Mileva Marić-Einstein.

Mileva was born in an idyllic small town, on the bank of the river Tisza, Titel, in the former Austro-Hungarian Empire, after the World War I, in Serbia, or actually the Kingdom of Yugoslavia, on December 19<sup>th</sup>, 1875, as the oldest child out of three children, in a wealthy family of Miloš and Marija Marić. Due to the specific call of her father (Austro-Hungarian officer, court supervisor), Mileva lived and was educated in several cities of the Austro-Hungarian Empire (Titel, Ruma, Novi Sad, Šabac, Sremska Mitrovica, Zagreb). She graduated from high school in Sremska Mitrovica as the best graduate in mathematics and physics. Thanks to the persistence of her

father Miloš, in 1891 she got the special license to enroll as a student into a school which was attended only by boys where she completed her knowledge in mathematics and physics.



Marić family house in Kisačka Street 20, Novi Sad, Serbia

Her brilliant mind took her to Zurich (Switzerland) in 1896, where she enrolled Swiss Federal Polytechnic as the fifth woman in the history of that school. She attended lectures on mathematics and physics with a special attention. She met Albert Einstein at the physics lectures. In the next two years, she moved to the University in Heidelberg. While Einstein was discovering the secrets of physics in Zurich, Mileva was in Heidelberg studying the photoelectric effect at the Nobel Prize winner Professor Phillip Lenard, and then with the help of Professor Hermann Minkowski she succeeded in solving the problems of four-dimensional projective geometry which represents the mathematical basis of the theory of relativity. Two years of separation of this young couple, between which love had already sparked, was compensated by correspondence in which, together with the subtle hints of love, they wrote about theoretical and experimental physics, following the principle in which Albert usually asked questions and Mileva responded and explained.



Mileva and Albert on the wedding day, January 6<sup>th</sup>, 1903

From Heidelberg (1897) Mileva wrote to Albert that professor Lenard had discovered that the energy absorbed in electrons of ultraviolet light increases with the frequency of light independently of the intensity of light. It is this understanding that helped intuitive Albert, altogether with Mileva's mathematical genius, to explain the "photoelectric effect" in 1905 for which he later won the Nobel Prize.

Upon his return to Zurich in 1899 the love between Mileva and Albert flared. Her parents were not opposed to this relationship, but Albert's parents, especially his mother Pauline did not support this love. What bothered them was Mileva's orthodox religion and Serbian origin, and they justified all that with the fact that she was three years older than him. Nonetheless, they got married in Bern on January 6<sup>th</sup>, 1903, after

which they got sons Hans-Albert (1904) and Eduard (1910), while they got their daughter Lieserl at the beginning of 1902, even before they were married. Feeling the support and love from Mileva's family, the young couple visited them in Novi Sad in 1905, 1907 and 1913. Affected with the traditional Serbian hospitality, Einstein gave his father-in-law, a passionate smoker, a pipe which he ordered as a present especially for him.



Mileva and Albert visiting Mileva's parents in Novi Sad 1905, 1907 and 1913

After staying pregnant, Mileva's academic career was interrupted in 1901 at the very moment when she was working on dissertation under the mentorship of physics professor Heinrich Weber. Being educated in a traditional orthodox patriarchal spirit, where the happiness of a family is above all personal wishes, desires and joy, she devoted herself to family. Her brilliant mind was literally put to service of Albert's work and career progress. It was in this period of family life, while Albert worked in a Swiss patent office in Bern where he spent the most of the day dealing with things that did not have anything with theoretical physics, that Mileva was at home thinking about mathematical and physics problems and solving them, which later brought them to Albert's most significant scientific discoveries, which enabled him a professor career in 1901.



The copy of Albert's letter to Mileva, 1901

In support of this claim we have some documents – letters and testimonies. Albert Einstein wrote to Mileva (March, 1901) by paying tribute to her literally saying: "How happy and proud I will be when the two of us together will have brought our work on relative motion to a victorious conclusion". The letter testifies the joint participation in the "Theory of Relativity". Also, in a letter from 1905, Einstein wrote to Miloš Marić, Mileva's father: "Everything that I achieved in my life, I must thank Mileva. She is my genius inspirer, my protector against the hardships of life and science. Without her, my work would have never been started nor finished".

Famous Soviet physicist Abraham Joffe (1880-1960) claimed that he had seen the original manuscript from 1905 on the "Theory of Relativity" with two signatures *Einstein – Mariti* (Hungarian variation of Marić, Austro-Hungarian Empire). The story of professor Joffe was supported by Professor Daniel Semjonovich who was discussing it in Princeton in 1946 together with Einstein.



Einstein's letter to Mileva's father Miloš, 1905

Scientific articles on the photoelectrical effect, special relativity and Brownian motion, according to the opinion of the most of remarkable physicists, are Einstein's three most significant works that deserved the Nobel's Committee to pay attention to them. It is interesting that those works were created exactly in the period of the greatest happiness and love between Mileva and Albert.



Daniel Semjonovich with Einstein in Princeton, USA, 1946

The first disagreements and tensions in their marriage happened in the middle of 1913 when Albert, influenced by a scientific glory and with a constant pressure of his mother Pauline to leave Mileva, openly put himself in the focus. Unlike him, Mileva considered their love and marriage sacred and something for all the times. Upon the invitation of Professor Max Planck, Einstein moved to Berlin. Separation was inevitable, and since the summer of 1914 they did not live together anymore. He lived in Berlin, and she lived in Zurich with children.

After five years of separated life, on February 14<sup>th</sup>, 1919, they were formally divorced. Same year in June, Einstein married his cousin Elsa Lowenthal to whom he already had had an incestuous relationship. He accepted her two daughters, and neglected his own sons whom he did not mention not even in his will.

Undeniable is the fact that, after divorcing Mileva, Einstein was not the same Einstein regarding science. His works and scientific discussions no longer had the same sense. He seemed to be more an eloquent and charming person with a tousled hair, at the same time very skillful with words, and he had success in promoting his scientific genius and in popularization of science which resulted in an outstanding financial and social effect.



Mileva and Albert, 1912, the last period of happiness, fidelity and love

Eight years after departing Mileva, Einstein won the Nobel Prize in 1922 for the year of 1921 for the paper which was old more than a decade, not for the theory of relativity but for proving the photoelectric effect. He sent the financial part of the prize to Mileva. It is interesting to say it was Mileva's requirement in a divorce case while the Nobel Prize still was not even in their minds. Einstein accepted easily, but such a requirement could only be set by a person knowing the value of the work and participating in it. Also, according to close associates, Einstein was saying that "he will not be peaceful while this woman is alive". He was afraid she would publish and document the autobiography.



Mileva with his sons Hans Albert and Eduard

After she got money, Mileva bought three houses in Zurich. She lived in one house with children, while the other two were investments for rent. After a longer period of time she finally did not live in want. But, the happiness left her again. Her younger son Eduard had a breakdown in 1930. He was diagnosed with schizophrenia. In order to raise funds for his care she sold the houses which she rented. Under the burden of life, disappointed in love, scientifically and emotionally betrayed, struggling alone with the son's illness and after suffering a series of strokes she died on August 4<sup>th</sup>, 1948. She was buried at the Nordheim cemetery in Zurich, after the Russian orthodox customs.



Miloš Marić, Mileva's brother, visiting his sister and brother-in-law, Bern, 1905

We have to use this opportunity and mention Mileva's brother, Miloš Marić (1885 - 1944; he got his father's name), Head of the Histology Department at the Faculty of Medicine in Saratov, Russia. He dealt with neurology, i.e. cytology (life cycle, cell division), and was the first in the world to carry out experimental cells cloning in medicine. It is also interesting that in written documents the family name Marić was mentioned for the first time in 1556.

In the end, what to say about Mileva Marić-Einstein except that she was *a genius from the shadow*, who devoted her scientific potential to family, to children and infinite love towards her husband. Knowing all these facts, we have to ask ourselves if Albert Einstein would have even existed in a scientific sense without Mileva.



Mihajlo Petrović (1868.-1943.)

The next, eight scientific-technical conference OTEH 2018 will be traditionally held at the beginning of October in 2018. The conference will be devoted to the Serbian mathematician Mihajlo Petrović - Mika Alas, the creator of the hydrointegrator (hydraulic integrator), the most precise artillery rangefinder in the WW I, the coder for encoding the military dispatches etc. Mihajlo Petrović won the golden medal at the world's exhibition of technical achievements in Paris in 1900 for hydrointegrator, the first constructed analog computer in the world. Serbian and Russian armies were equipped with his artillery rangefinder. In the cryptography field he made the coding system which was used by the Serbian Army from the WW I until the WW II.

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## **Sedmi Međunarodni Naučnostručni Skup iz Oblasti Odbrambenih Tehnologija OTEH 2016**

Dat je prikaz rada sedmog naučnog skupa istraživača koji se bave odbrambenim tehnologijama, a koji je u organizaciji Vojnotehničkog instituta iz Beograda održan od 06-07. Oktobra 2016. godine. Nakon opšteg prikaza tog skupa, koji je posvećen srpskoj matematičarki Milevi Marić – Anštajn, predstavljeni su neki od 134 prihvaćenih radova koji su po opštem mišljenju pobudili najviše interesovanja.

## **Седмая международная научная конференция в области оборонных технологий OTEH 2016**

Здесь показана работа седьмого научного собрания исследователей, которые изучают оборонительные технологии, а которое организовал Военнотехнический институт из Белграда с 6 по 7 октября 2016-ого года. После опшего показа этого собрания, который посвящен сербский математик Милева Марич Эйнштейн, представлены только некоторые из совокупных 134 принятых работ, которые по общему мнению побудили по большей части интересования.

## **La septième conférence scientifique internationale sur lestechnolies de défense OTEH 2016**

Un compte-rendu sur les activités lors de la septième conférence scientifique des chercheurs qui travaillent dans le domaine de la technologie de défense est présenté dans cet article. La conférence, organisée par l'Institut militaire technique de Belgrade, a eu lieu du 6 au 7 octobre 2016. Après le général compte-rendu sur cette réunion scientifique, qui est dédié a Mileva Maric – Einstein mathématicien serbe, on a présenté certains de 134 travaux acceptés qui, selon l'opinion générale, ont attiré la plus grande attention.