

Izabela KOPTOŃ-RYNIEC

Museum of the Warsaw University of Technology
 Warsaw University of Technology, Plac Politechniki 1, 00-661 Warszawa
 e-mail: Izabela.Ryniec@pw.edu.pl

TO BE AS WOLAŃSKI, THAT IS, HOW TO MEET THE DREAMS OF THE YOUNG AGE WHEN BEING A BOY AND INVENTOR OF SPACE DRIVES

BYĆ JAK WOLAŃSKI, CZYLI JAK SPEŁNIAĆ MARZENIA MŁODOŚCI BĘDĄC CHŁOPCEM I WYNAŁAZCĄ KOSMICZNYCH NAPĘDÓW

The present paper is a continuation of the article which was published in the previous edition of Polish Technical Review. It is a story about Prof. Piotr Wolański from Warsaw University of Technology, a visionary who – apart from the problems concerning combustion, explosions and space drives – was able to give the positive energy and passion to the students as well as his collaborators all over the world. How it happened that a boy from a small, mountainous settlement “reached the stars”, becoming the inspiration to the younger generations? The authoress of paper concentrates her attention on the motivating aspect, being perceived from the viewpoint of Professor as well as his pupils and also, she gives the floor to the mentor himself.

According to Dante Alighieri, *Three things remain with us from paradise: stars, flowers and children*. For Piotr Wolański, born in August Sunday in 1942 in Milówka at Żywieckie district, the mentioned three paradise attributes constituted the integral company since his early childhood. Family of this extremely witty young man made their living from agriculture as well from the salary of father of Prof. Wolański – a surveyor who before the war gained the championship of Poland in chess compositions. Most probably, young Peter inherited the passion to solve the problems and gumption to science just from his father. The future Professor was not the only one child in the family as he shared the rooms with his three siblings: older brother Adam and sister Barbara and younger sister Krystyna. As it was revealed later, all of them received higher education. In their family house, a great attention was paid to development of interests and, consequently, the pressure was laid on science what was not a rule in the post-war Poland. When being a pupil of primary school, Piotr, as revealing the greatest interest in mathematics and physics and the related sciences, experienced his first scientific fascination which had the influence on the whole his life. At the middle of the fifties, he had the occasion to see a start of American rocket



Photo 1. Piotr Wolański (first from the left) with the parents: Joanna and Eustachy and the siblings in the native locality Milówka. Next to him, older brother Adam Wolański and two sisters: Christine and Barbara

Source: Home archives of Prof. Wolański

“Aerobee”. Although it was only a relation transmitted in the Film Chronicle which he saw at the local movies “Tęcza” (in English: “Rainbow”), the mentioned impulse was enough for construction of rockets and design of space drives to become his life passion. The flammable cellulose photographic films were the fuel for the model rockets, constructed by young Piotr. He received them from the priest Henryk Hubner, catechist and teacher of photography of the future Professor. What else was the motivation for him, stimulating the continuation of further learning?

As since the primary school until the end of secondary school he helped – together with his siblings – in agricultural work, and, *inter alia*, in cow grazing, driving of horses, crop harvesting or mowing, at the area there the level of plots, situated even 2 km from his house reached 200 m above the level of Milówka. The exhausting character of the mentioned work, as being performed usually manually, strengthened the decision of Piotr

PROF. PIOTR WOLAŃSKI, PHD, ENG.
(1942–2023)



Professor of Warsaw University of Technology (PW) and Aviation Institute (Łukasiewicz Research Network). Since 1966, related to Warsaw University of Technology where he defended his PhD thesis at the Faculty of Power and Aeronautical Engineering in 1971. In 1979 he obtained the title of habilitated doctor and in 1988 – the title of professor of technical sciences.

In the years 1987–1990 he was the dean of his native faculty; 1981–2012 – Head of the Division of Aircraft Engines at the Institute of Heat Engineering. In the years 2002–2005, Vice-Rector for Science at the Warsaw University of Technology. From 1990 to 1994 – President of Polish Astronautic Society; after termination of the cadence – Honorary President of the mentioned association. Since 1995 – the member of the Committee of Cosmic and Satellite Studies of Polish Academy of Sciences. In 2003, he became the President of the mentioned above committee for the successive 4 cadencies. Since 2019 – the Honorary President of the Committee. The member of Warsaw Scientific Society – Department IV of Technical Sciences. In the years 2016–2022 – the member of the Executive Committee of Engineering Academy in Poland. The member of the Council of the National Centre for Research and Development in the period of 2014–2018. He was also the member of the International Astronautical Academy (IAA) and also, of the Council of the Polish Space Agency (2015–2020). A visionary who made the enormous contribution to Polish space sector when outlining the series of areas for future development and hypotheses: on the origin of Moon, or decay of dinosaurs. In his scientific activity he undertook the problems connected with the combustion and the methods for diagnostics of combustion processes, explosions, combustion engines and collisions with celestial bodies. The discoverer of diffusion ignition, developing the area of cosmos drives and rockets of repeated use. Under his patronage, the first Polish satellite called PW-Sat was constructed at Warsaw University of Technology. The direction of studies: "Aviation and Cosmonautics" became the permanent direction of the studies at Polish technical universities. He was appreciated abroad as the lecturer, *inter alia*, at Michigan University in Ann Arbor (USA), at Northeastern University in Shenyang (China) and at Nanyang Technological University (Singapore). Doctor *honoris causa* of Azerbaijan State University of Petroleum and Industry in Baku (1997) and the Józef Dąbrowski Technical Military Academy in Warsaw (2015). Laureate of many awards, including the Award of the Minister of Science and Higher Education for the lifetime achievements, the award of the aviation environment "Blue Wings" (2016) for the overall achievements in respect of cosmic scientific and didactic activity. One of the most frequently cited authors of scientific publications, being found at the list of the World's TOP 2% Scientists.



Photo 2. Launching of the rocket with the fuel coming from cellulose photographic films. Source: Home archives of Prof. Wolański

about change of his life style. As he said – *I was very interested in space and didn't want to work hard in agriculture, this motivated me to pursue higher education.* Thinking of Piotr Wolański was so much focused on the heaven spheres that even the nearest secondary school, situated at the distance of half-an-hour by train and 3 km from railway station (which he chose for the continuation of his education in Żywiec) bore *nomen omen* the name of the great Pole and astronomer – Mikołaj Kopernik, whose jubilee of the 550th birth anniversary was solemnly celebrated in 2023. The analogy to the famous name of the astronomer appeared in the Professor's life also in 2014, at the seat of the Unites Nations Organization in Vienna where – owing to his initiative – a copy of the painting by Jan Matejko, "Astronomer Kopernik, that is, conversation with God" was unveiled.

In 1957 when he attended the 9th class of the secondary school (lyceum), launching of the first artificial Globe satellite had place; it was "Sputnik-1". As he said in his autobiography – *It may be said that already then I was in friendly relations with the Space.* After launching the first and the second Sputnik, the editorial office of the periodical "Świat Młodych" (in English: "The World of the Youth"), the weekly for the school pupils, has announced the competition about the space topics: *Astral expedition*. I was awarded with the 3rd place in this competition and the award was monthly pioneer campus in Bulgaria (Złote Piaski near Warne). It encouraged undoubtedly the future student of the Faculty of Aviation at Warsaw University of Technology (1960) which was transformed into the Faculty of Power and Aeronautical



Photo 3. Piotr Wolański at the Astronautic Congress in 1964

Source: Home archives of Prof. Wolański

Engineering in November 1960. During the next years which were described in detail in the article "Professor Wolański – cosmic authority, the pearl of Polish Science" (Polish Technical Review 4/2023), Professor reached the successive level of scientific and professional career; he participated in various bodies and assemblies which gave him the experience necessary at the University as well as in the Institute of Aviation where he was employed since 1992. He listened always to the people and was open to challenges and various situations. His readiness to cope with the unforeseeable circumstances was almost the fate challenge when meeting the persons who being once univocally identified with the widely understood space industry. As early as during his studies, during the "Aviation Salon" in Paris, he made the connaissance with Yuri Gagarin – the first man in the cosmos space. The circle of the persons who became known

personally to him included, *inter alia*, Walentyna Tierszokowa (Valentine Tereshkova) – the first woman in cosmos and the only one who made the cosmic flight alone (as a single person), Scott Parazynski – the cosmonaut of Polish origin, or John F. Hall – NASA Director, expert of Polish Space Agency, who after the end of the Professor's cadence as the Chairman of the Committee of Space and Satellite Research of Polish Academy of Sciences in 2019, sent the following letter: *You rocked! You have done so much for Poland in space. There is no one – not anyone in Poland – who has accomplished so much for all of us across the years. Through your many decades of hard work and dedication, you have opened the path for all of us here in Poland, and we will now follow it to wonderful conclusion on missions to the Moon, Mars, and beyond. Many thanks to you for the privilege of calling you my friend along this exciting journey.* In the collection of photos of Professor, there is also found a personalized autograph of Neil Armstrong – the first Man on the Moon.



Photo 4. Doctor P. Wolański with the model of Space Shuttle

Source: Home archives of Prof. Wolański

Professor Piotr Wolański as the lecturer of the Faculty of Power and Aeronautical Engineering of Warsaw University of Technology and, also, the patron and creator of **Students' Space Association at Faculty of Power and Aeronautical Engineering**, transmitted his knowledge vividly and patiently. Dr Adam Okniński, Eng., – doctoral student of Professor and nowadays Director of the Centre of Space Technologies at the Aviation Institute **Łukasiewicz Research Network** recalls: – *Through his words and actions, he always encouraged us to work hard and set up ambitious goals. Also to do the work now, not to postpone – in the future we might not have time. After returning from foreign visits, Professor Wolański would share his materials and show us what other leading units were doing. He argued, "Well, if they could do it, so can we". Professor promoted also the activity, exceeding our basic duties*



Photo 5. Prof. Piotr Wolański after the ceremony of transfer of the copy of the painting "Mikolaj Kopernik (Nicolas Copernicus) – the conversation with God" by Jan Matejko, and of the model of satellite "BRITE-Lem". Source: Home archives of Prof. Wolański

To Prof. Wolański with many thanks!



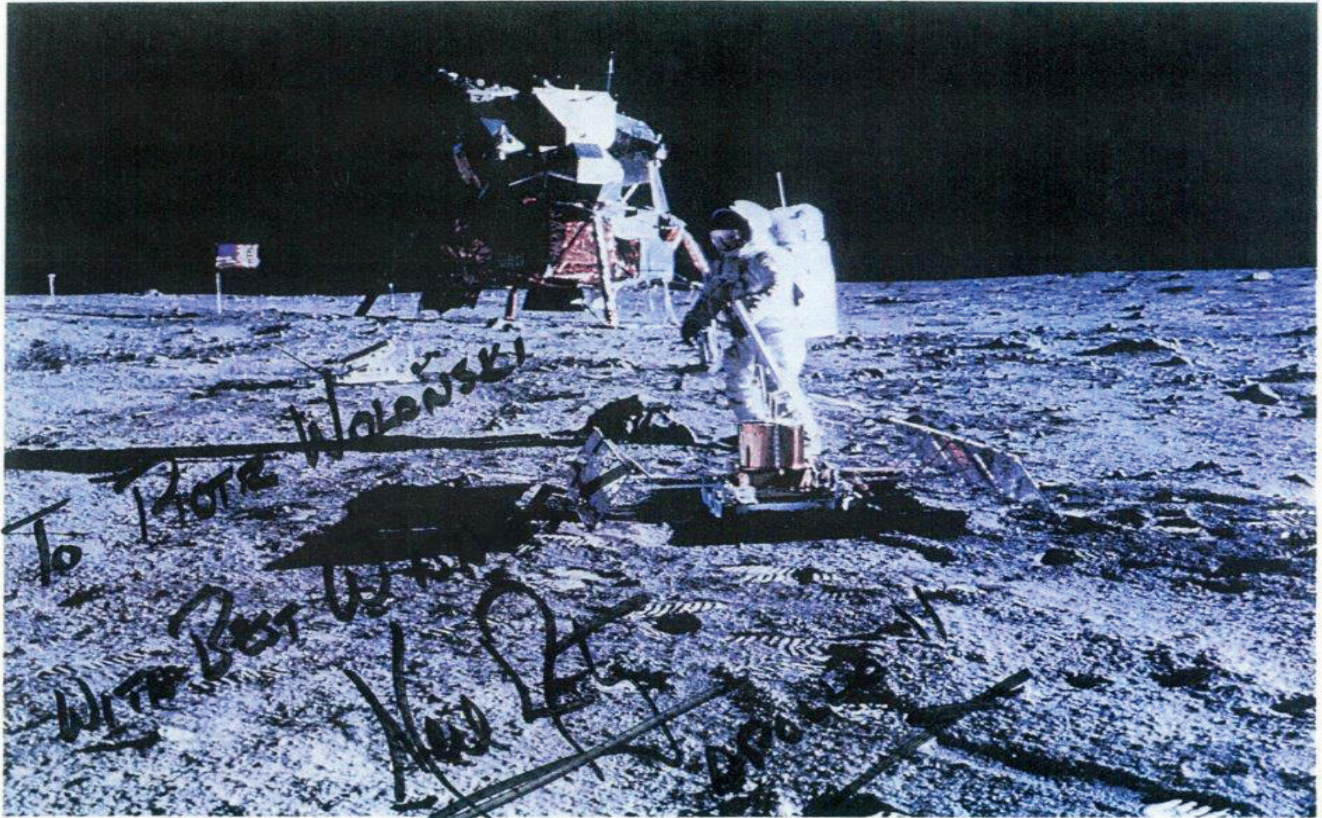
Photo 6. Dedication of astronaut Scott Parazynski for Prof. P. Wolański
Source: Home archives of Prof. Wolański

– publications, obtaining scientific titles or degrees, activities in the international organizations and participation in the competitions. Owing to his support and urging, I attended in the activity of many prestige bodies. During the recent years, he told me to promote the young promising scientific works, similarly as he was doing. After the meeting during which we decided on the further plans of activities, and with which he was satisfied, he

said: "It's cool, Mr. Adam". And he adds: – I will remember Professor as outstanding scientist, being also open to young people, and as a kind-hearted man. He had a series of international scale-achievements about which we must remember and speak. As Professor reminded often his mentor – Prof. Stanisław Wójcicki, so we, his pupils, will remind him forever. Professor Wolański was a patriot; he stressed the achievements of Polish science in the development of space technologies all over the world. Apart from historical achievements of pioneers dating back to some centuries ago, he showed and promoted not only the achievements obtained at the Warsaw University of Technology and at the Institute of Aviation but also in the total national space sector.

The viewpoint of Professor Wolański in respect of science development and its creators may be known owing to the interview granted to Bulletin of Warsaw University of Technology in 2013 – *Scientific condition in the contemporary world is dependent on a few aspects. Certain studies, not only in astronautics, may be carried out when we have instruments and equipment which allow implementing such studies. Even if someone had the most magnificent brain but had been lacking the mentioned apparatus, he would not reach the discussed target. On the other hand, if someone has the best instruments, and does not have a brilliant mind, he will be not able to reach the discussed aim. In the United Europe, we have an access practically to everything. It is dependent on our predispositions to implement the goals. The Poles are already present in the European institutions such as CERN or ESA and although we are at the beginning of this path, I am sure that they work at the equivalent level and sometimes even at the better one. I repeat it to all my students that of they have any doubts, they should deprive of them because the level of our learning is, in many aspects, comparable and the result are the same. We should be only mobilized to work; then, we will be able to obtain much. There is no reason to feel inferior to the West. When answering to the question whether Polish people will fly to cosmos, Professor anticipated, in a certain way, the events which occurred ten years later after the interview. – I am convinced that the Poles will fly and it won't be one but many my countrymen. The development of the cosmic space – from the perspective of humanity – has been just commenced. I am very optimistic in this respect. I think that I won't fly personally, although Senator Glenn when being at my age made this journey.*

The first Pole who was found on the geocentric orbit was, of course, gen. Mirosław Hermaszewski (1941–2022) who during the mission of Sojuz 30-Salut 6 in 1978 encircled the Earth 126 times; during this mission, together with the Russian astronaut, Piotr Klimuk they conducted biological experiments, including those ones concerning the reaction of organism to zero gravity state, and performed geophysical studies e.g. observations of aurora borealis. Later on, he told about his experiences during



"That's one small step for a man, one giant leap for mankind."

Photo 7. Dedication of astronaut Neil Armstrong for Prof. P. Wolański

Source: Home archives of Prof. Wolański

the numerous meetings and became fully involved in popularization of astronautics. Just before the death of gen. Hermaszewski, Sławosz Uznański became selected and included to the group of the reserve astronauts of the European Space Agency (ESA), participating in the mission to the **International Space Station (ISS)**. On September, 1, 2023, he joined the European Astronaut Corps (EAC). To-day, we know almost certainly that 39-years old engineer and PhD holder from Łódź University of Technology, graduate of Université de Nantes, Université d'Aix-Marseille and worker of CERN (**The European Organization for Nuclear Research**), as being already the project astronaut (not reserve) will carry out various experiments at ISS and will test the solutions, developed by Polish research units. More than 22500 people from all member states sent in their application. One of them was the Spanish, Pablo Álvarez Fernández who was the graduate of Warsaw University of Technology, and came from the native Faculty of Professor Wolański, i.e. Faculty of Power and Aeronautical Engineering. Fernández was included to the basic corps of ESA astronauts.

Almost prophetic words of Professor about the future which is fulfilled at our presence in the context of the future exploration of the Space and including Polish accents are the proof how careful observer he was and how he believed in the creative power of the young people. Director of the Aviation Institute **Lukasiewicz Research Network** Dr Paweł Stężycki, Eng., when talking with the authoress of the article stressed a great personality of Prof. Wolański and said about him in a metaphoric way: – *A man with*

such size of hat occurs very rarely. I treat it as the honour for me, as something extraordinary that I had the pleasure to stay with him and talk in private so many times. In the reminiscences of director of the Institute where Prof. Wolański had been employed since the early nineties of the 20th century, the theme of time also appears; Professor treated it with a specific attitude. – He had a low tolerance for laziness; he respected the time and did not like to waste it for meaningless activities. He knew the value of time and spoke about that it could not be calculated into any money. He was very diligent and laborious and required the same from others, irrespectively of the degree of their talents. The undertaken efforts and the consequence in action were fundamental. Professor appreciated it very much. It was the mentioned earlier, hard "highlander's way of life" which he experienced himself at his childhood. One of the last talks of Stężycki and Wolański concerned establishment of the foundation or grant by his name which would support young, clever scientists, acting in the field of rocket, or general space technologies. The funds would come from the Institute, Warsaw University of Technology and from voluntary contributions of friends, family and other persons familiar to Professor. Starting up of the mentioned initiative is planned for 2024. – We talked about it exactly 4 days before his death, perhaps he felt something. He wanted to leave behind him the measurable support for the students, facilitating them development of their passions – his passions.

Professor Piotr Wolański contributed to creation of **Polish Space Agency, POLSA** which owes its present name to him.

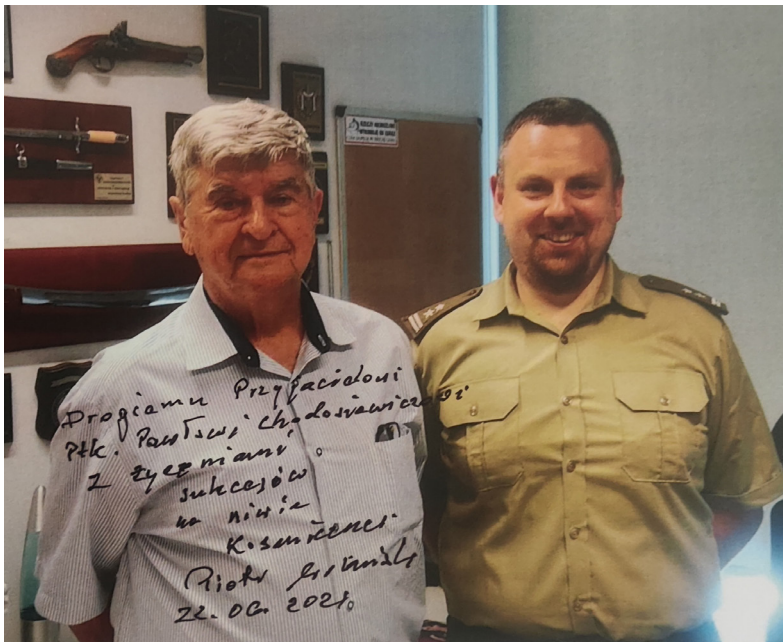


Photo 8. Prof. P. Wolański and Colonel Dr P. Chodosiewicz, Eng
Source: Archives of Colonel Dr P. Chodosiewicz, Eng.



Photo 9. Sławosz Uznański
Photo: Tomek Gola, POLSA

As it is recalled by Colonel Dr Paweł Chodosiewicz, Eng., expert from **Space Safety Department of POLSA**, for whom Professor was the lecturer, mentor and friend – He was one of the main spokesmen of establishing Polish Space Agency. He knew that the national industry, scientific-research, simply the total Polish space sector cannot be effectively developed without the mentioned institution. After foundation of the Agency, Professor had been the member of the Council of POLSA, until his last days of life he supported the space sector in all aspects and domains. And he adds – There is no doubt that the silhouette of Prof. Wolański has been permanently recorded in the history of Polish and also, international cosmos. We cannot forget about what he had done for science. His achievements were, are and will be studied, cited and quoted many times. He educated not only many students but also the innumerable number of young people will take inspiration from his work. His life showed that in order to achieve success in the international scale, you must be first of all, yourself, a man open to others. The implementation of the goal by any possible ways, without paying attention to the environment is for weak people and Professor Wolański certainly did not belong to such people. What type of man he was, then? According to Colonel Chodosiewicz, Professor was the open man, unusually positive, and, moreover, speaking directly what his concern was, including also very expressive statements. He never refused helping, both in didactic as well as in private sphere. The scientific titles were not “disturbing” for him; he did not promote them; on the contrary, he was modest in this respect. He had a big respect in the scientific environment and he was very well recognized. He had a great respect to military uniform. During different official meetings when we talked about the topics connected with defense, he used to say teasingly: Mr. Colonel, I cannot express the opinion on it, I obtained only the degree of corporal cadet in the army”. Professor

was not only able to transmit the possessed, enormous knowledge but he was also very social and eloquent person, the life and soul of the party. He liked to tell the jokes and, also various stories from professional and private life, referring also to his native Milówka where he always loved to come back. He kept promises expect perhaps the only one – he was expected to be at my PhD dissertation; unfortunately, it had place after his death but I think that he was present even there spiritually.

The similar reminiscences concerning Professor Wolański come from Dr Aleksandra Bukała, Director of **Department of Strategy and International Cooperation of POLSA** whose memory about this outstanding person reaches as early as his family house where she had the occasion to meet Professor for the first time. – I had known him since a child because my father was also a graduate of Faculty of Power and Aeronautical Engineering at Warsaw University of Technology. Their paths of scientific work were crossing many times what, with the time elapse, had been transformed into friendly relations. Professor was a frequent guest in our house and when I began my adventure with the space sector (more seriously in 2012), our relations gained a professional – vocational nature. For me, he was always a person with the enormous knowledge and such knowledge which should be taken into consideration, even when I could not agree with it initially as I knew that it was justified and supported by many years of experience. In spite of the fact that the path of professional career of Mrs Bukała ran irrespectively of the discussed connaissance, when we met during the official meetings, she reminded a “biting” language of Professor. – I remember the situation from the post-graduate studies on cosmos which were hold by Professor Wolański. A group of the students submitted the material about the program of space shuttles. The quality of the presentation was not the highest one, even for amateur. Professor



Photo 10. Poster on the occasion of the 550th anniversary of birth of Mikołaj Kopernik (Nicolas Copernicus)

Source: POLSA

waited until the end and summed up it in tart words: “you are not even able to copy correctly the information from Wikipedia” – she reminds. According to Mrs BuKała, the uncompromising nature of Professor in the field of knowledge and science consisted, *inter alia*, in the precise formulation of the statements in accordance with the principle: *if I do not know, I do not comment*. Owing to the unaffected attitude of Professor, POLSA is to-day a serious partner at the international forum and meets his dreams on building the strong cosmic sector in Poland with a strong and competent Cosmic Agency.

Polish technical science derives, *inter alia*, from the solutions, suggested at the native universities although it would be difficult to conduct the considerations about the development of cosmic industry without the discovery of scientist from Warsaw University of Technology, Prof. Jan Czochralski (1885–1953). It refers to the method for production of mono-crystalline silicone. Due to this fact, Professor Czochralski became the precursor of the production technology of integrated circuits, indispensable in production of electronic elements. As the recognition of his merits, Warsaw University of Technology runs the **Competition for the Jan Czochralski Award** for the best graduate diploma and PhD thesis. The mentioned award may be granted also for the outstanding scientific achievements and/or applied work in the field

of activity of Prof. Jan Czochralski, including, *inter alia*, processes of crystallization and recrystallization, studies on the structure and properties and application of single crystals and, also, metals and alloys. Many years later, another scientist from the **Faculty of Automotive and Construction Machinery Engineering at the Warsaw University of Technology**, Prof. Mieczysław G. Bekker – creator of terra mechanical engineering – became the constructor of Lunar Rover Vehicle (LVR) in Apollo program where, in particular, he was responsible for the driving system of the mentioned device. On the other hand, the penetrator MUPUS, being constructed with the cooperation of the scientists from the **Faculty of Materials Science and Engineering of the Warsaw University of Technology**, participated in Rosett/Philae mission (2004–2016). The integrated circuit Rosettabis, as employed in the above vehicle, was designed at the **Institute of Microelectronics and Optoelectronics of the Warsaw University of Technology (PW)**. MUPUS was activated after landing on the nucleus of Comet 67P/Czuriumow-Gerasimenko where he was drilled in the Comet’s ground. On the 5 of May 2018, the start of the NASA mission InSight had place, aiming at examination of the internal structure of Mars. The scientists from the Warsaw University of Technology participated also in the preparation of the device which helped to examine the Red Planet. We should also mention two students’ satellite, being launched into cosmos: PW-Sat1 (2012) – the first Polish artificial satellite and PW Sat 2 (2018). They were produced at the Students Astronautic Circle of the Faculty of Power and Aeronautical Engineering at Warsaw University of Technology. The mentioned Circle was guided by Prof. Piotr Wolański. Recently, the students associated in the discussed Circle, undertook the trial to examine the effect of UV light on the samples of composites and effect of cosmic irradiation on solar panels. The project “CURIE” was qualified to the international programme BEXUS, implemented by the **German Aerospace Center** and **Swedish National Space Board**, in cooperation with the **European Space Agency (ESA)**.

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The source of quotations from the statements of Dr Paweł Stężycki, Eng. and Dr Adam Okniński, Eng., comes from the talks and own correspondence of the author of the present paper, Izabela Koptoń-Ryniec, as being conducted in October and November 2023 and with Colonel Paweł Chodosiewicz and Dr Aleksandra BuKała in February 2024.