Faculty of Mechanical Science and Engineering
Institute of Aerospace Engineering
Chair of Space Systems

MSCA PF Online Workshop 2025

Suk Min, Choi (최석민)

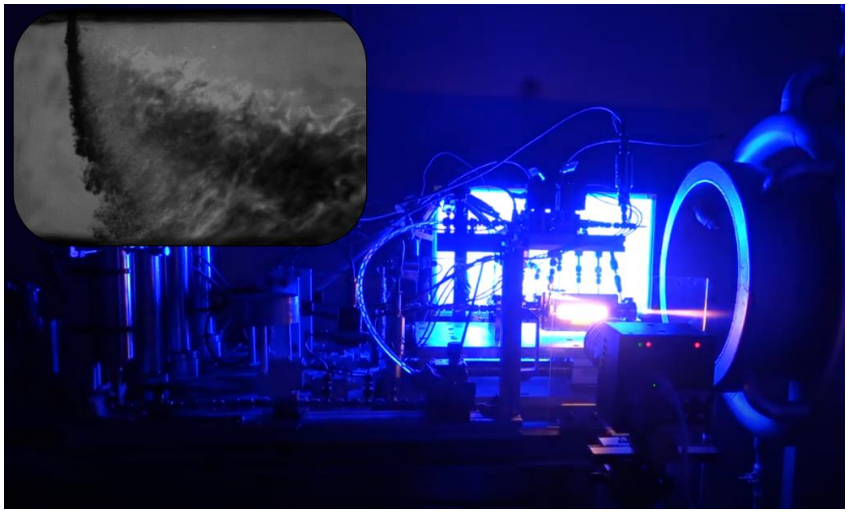
19.05.2025

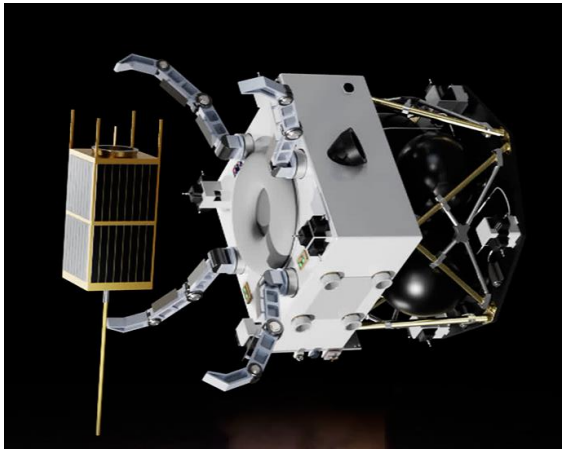
Self-Introduction

- **Research interests**
  - Rocket propulsion system using *Green Propellants*, Advanced nozzle concepts, Transpiration cooling system, Lander spacecraft application,…

- **Academic records**
  - Feb.2012 – Feb.2016: **Ph.D.**, Aerospace Eng., KAIST (PI: Prof, Sejin Kwon, Jae-myung Ahn)
  - Feb.2016 – Feb.2018: **M.Sc.**, Aerospace Eng., KAIST (PI: Prof. Sejin Kwon)
  - Feb.2018 – Feb.2022: **B.Sc.**, Aerospace Eng., KAIST

- **Work experiences**
  - May.2024 – Current: **MSCA Postdoctoral fellow**, TU Dresden (PI: Prof. Martin Tajmar)
  - Mar.2023 – Mar.2024: **Research associate**, KAIST SaTReC
  - Mar.2022 – Feb.2023: **Postdoctoral researcher**, KAIST Institute of Mechanical Technology
  - May.2021 – Dec.2021: **Visiting researcher**, DLR Institute of Space Propulsion





Rocket Science without Borders? Not Quite

Propulsion Engineer (Merlin Development and Hardware)

Apply

Hawthorne, CA

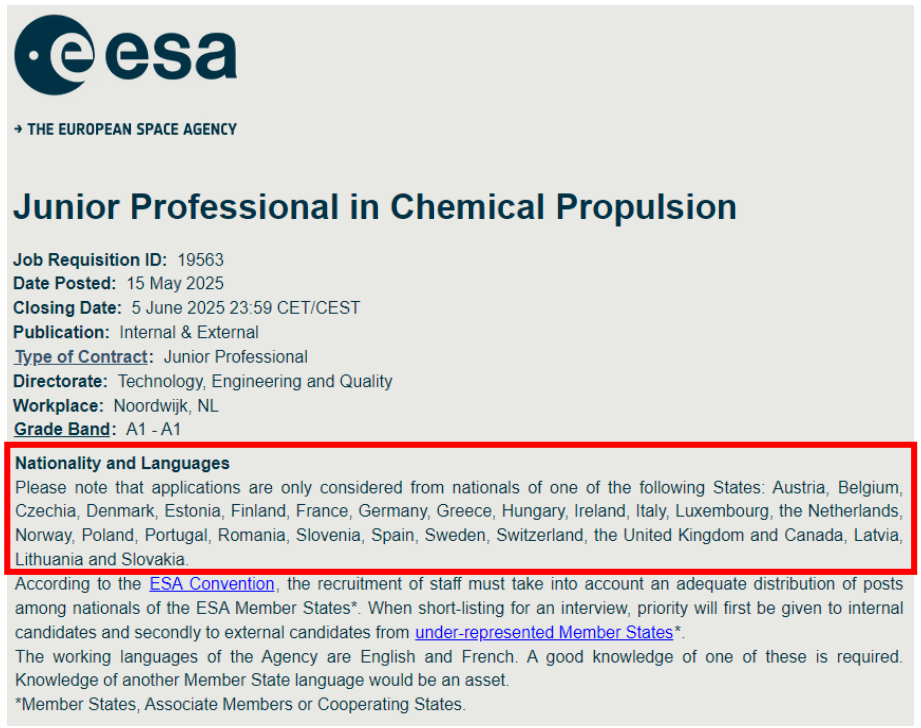
SpaceX was founded under the belief that a future where humanity is out exploring the stars is fundamentally more exciting than one where we are not. Today SpaceX is actively developing the technologies to make this possible, with the ultimate goal of enabling human life on Mars.

PROPULSION ENGINEER (MERLIN DEVELOPMENT AND HARDWARE)

Merlin Propulsion Engineers are responsible for ensuring flightworthiness of engine hardware and software throughout the life cycle—from initial build, through acceptance testing, and into flight (and re-flight) operations. You will exercise extreme ownership over engine hardware and drive all processes necessary to increase engine life as we continue to push the bounds of reusability. Additionally, you will be responsible for driving reliability-improving and rate-enabling initiatives to maintain the long-term success of Falcon as the most-flown, most-reliable launch vehicle in existence.

ITAR REQUIREMENTS:

- To conform to U.S. Government export regulations, applicant must be a (i) U.S. citizen or national, (ii) U.S. lawful, permanent resident (aka green card holder), (iii) Refugee under 8 U.S.C. § 1157, or (iv) Asylee under 8 U.S.C. § 1158, or be eligible to obtain the required authorizations from the U.S. Department of State. Learn more about the ITAR here.



esa

→ THE EUROPEAN SPACE AGENCY

Junior Professional in Chemical Propulsion

Job Requisition ID: 19563
Date Posted: 15 May 2025
Closing Date: 5 June 2025 23:59 CET/CEST
Publication: Internal & External
Type of Contract: Junior Professional
Directorate: Technology, Engineering and Quality
Workplace: Noordwijk, NL
Grade Band: A1 - A1

Nationality and Languages
Please note that applications are only considered from nationals of one of the following States: Austria, Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland, the United Kingdom and Canada, Latvia, Lithuania and Slovakia.
According to the ESA Convention, the recruitment of staff must take into account an adequate distribution of posts among nationals of the ESA Member States*. When short-listing for an interview, priority will first be given to internal candidates and secondly to external candidates from under-represented Member States*.
The working languages of the Agency are English and French. A good knowledge of one of these is required. Knowledge of another Member State language would be an asset.
*Member States, Associate Members or Cooperating States.

Being involved in research projects related to rocket propulsion technology in major research institution is nearly impossible for foreign nationals

Motive for choosing the host institution

- **Prior experience as a visiting researcher at DLR Institute of space propulsion**
  - Participated in the **NRF-DAAD funded GEnKO program**
  - Familiarized myself with the German academic environment and enjoyed!
    → Research field is small… Colleagues from this experience are great references
  - Became to realize that German university is strictly regulatory in dual-use
    → In return, I can join German academia with less concern caused by my nationality
  - However, DLR is such a huge organization… concerned that I couldn't conduct must research within 2 years period

- **Former relationship with the supervisor and the research group**
  - I recognized their main research topic, host institution knew my past career and skills
    → Mutual trust was already established… Skipped all the 'get to know' phases..

- **My research interest coincided with my current research group's topic**
  - **Most important factor** in choosing your host institution
    → Guaranteed to do the research that I would like and the institute fully supporting my work

Overview of MSCA PF application

- **Form B1 is the core of the evaluation!!!!!**
  - In today's presentation, tips I learned for writing Form B1 will be mainly introduced..

- **Form A / Form B2 are not determinant factors in the selection:** Follow the template
- **Host institution is liable for the F&T portal submission:** Get to know who's responsible

Form A

General info about proposal

Admin. data and role of participating organisation

Researchers table

Budget

Ethics and security (assessment)

Call specific questions

Gender equality declaration (TUD YES)

Form B1 (core)

Template in rtf available

PDF UPLOAD (in FTP)

Excellence

Impact

Implementation

! max. 10 pages !

Form B2

Template in rtf available

PDF UPLOAD (in FTP)

Scientific CV

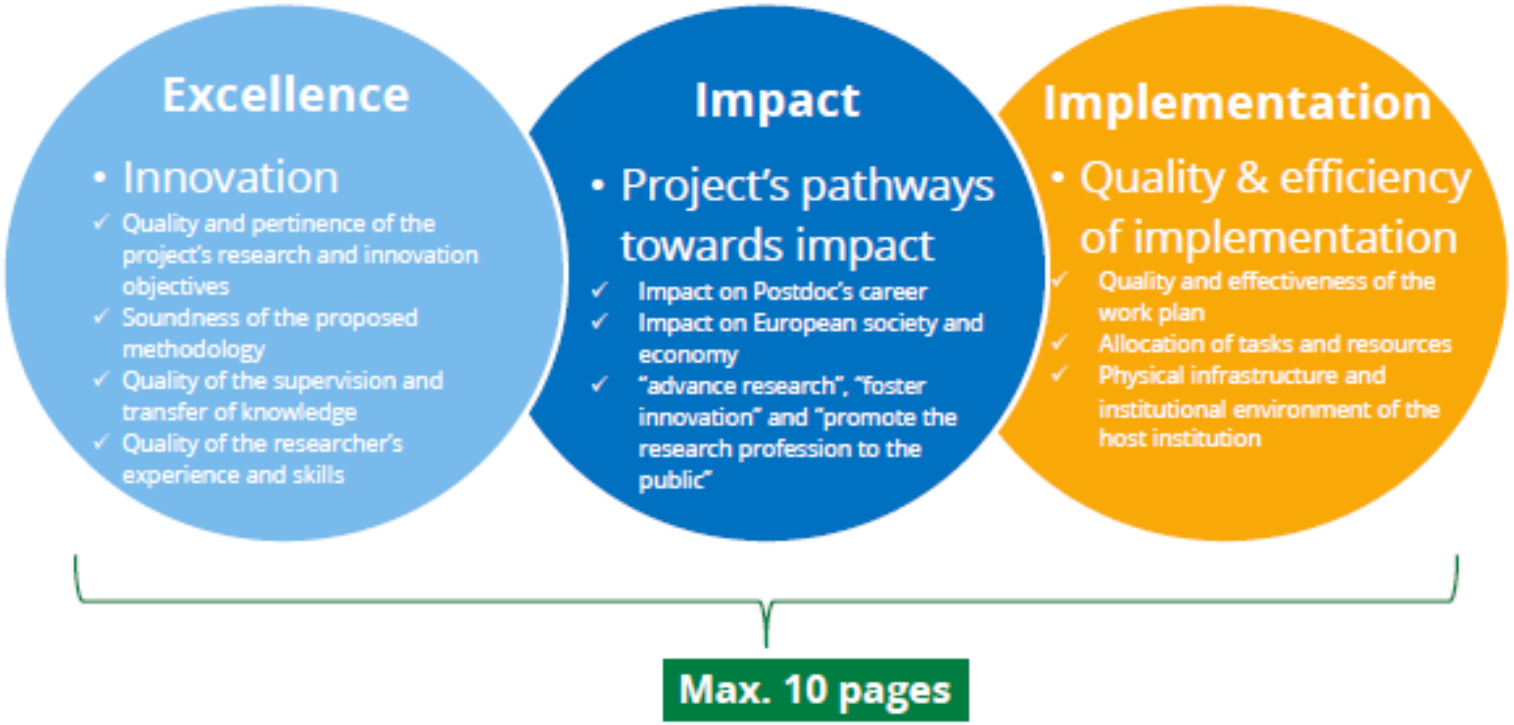
Capacity of the participating Organisation (table)

Additional information (Ethics, Security)

Letter of Commitment (GF or/and Placements only)

Overview of Part B1

- Part B1 consists of 3 parts: Excellence (50%), Impact (30%), Implementation (20%)



Possible Weaknesses

- **Excellence:**
  - The proposal lacks consideration of **recent international developments and current knowledge gaps**
    → Choose the topic considering the current trend of your research field…
  - Research methods are **not sufficiently aligned** with the research topic
  - The objectives are **over-ambitious**, reducing the overall credibility of the proposal
    → Balance the proposal from being over-ambitious but still novel, state-of-the-art
  - **Networking opportunities** are underdeveloped
    → Fellowship is not just to financially support the researcher, but also provide you to join and contribute to the European community…
  - **Innovation** is not clearly demonstrated
  - **Knowledge transfer** from the researcher to the host is limited
    → Must highlight what you can do that host institution can not and vise versa, suggest how both entities can benefit from the fellowship

- **Impact:**
  - Most negative aspects originated from **being too generic** for **not been adequately addressed**
    → Write the determinant factors and highlight them. Give quantitative figures if possible… (how many publication at where? How to quantitatively measure your research success?)

Possible Weaknesses

- **Excellence:**
  - Work Plan consists of **too many tasks and work packages**
  - **Allocation of time to tasks** is not adequately justified
  - **Gantt chart has no sufficient level of detail**
    → Always aware that over-ambition will backfire
  - Deliverables and milestones are **not clearly shown** in gantt chart
  - Training aspects are not adequately indicated in work plan and gantt chart
  - **Potential risks have not been addressed**, contingency plan not sufficient
    → Include and highlight all the determinant factors
    → Here, the level of detail would be limited by the length of the proposal…

Tips in writing the proposal #1

- **Writing proposal takes time… Start writing a draft now!**
  - Writing a draft may be just the short portion of your proposal writing process…
  - Concentrating the content within 10 pages while checking it contains all the necessary key points takes time
  - Always consider the time required for revision after you receive recommendations from your supervisor, funding support office, co-workers, friends…

- **You must follow the instructions on FORMAT!**
  - This is utmost requirements that you must follow
  - There are still ways to put as much content as possible while following the instructions

1. Use figures and tables as much as you can (Table is allowed to use smaller font, Texts within the figure *were* not regulated…)
2. Reference style is not specified… Use the most shortest one to save space

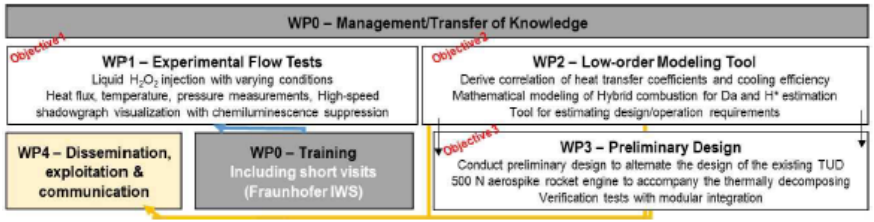


Figure 4. Overview of the work plans and the interaction between WPs

[1] J. Yang et al., Nature Climate Change, (2013) **3**(10), 875–883
[2] A. C. Boley and M. Byers, Scientific Reports, (2021) **11**(1), 10642
[3] B. M. Mrusek, International Journal of Aviation, Aeronautics, and Aerospace, (2019) **6**(2)
[4] ESA Space Debris Office. (2022). *ESA'S Annual Space Environment Report.*
[5] D. Mcknight et al., 8th European Conference on Space Debris (2021)

Tips in writing the proposal #2

- Use Bold, *Italic*, different colors to highlight the key points
  - Part B2 is packed with texts and evaluators are reading large number of proposals
  - If you write the proposal in plain text, they might miss what you wrote and deduct score
  - Always, highlight the key determinant factors, but use them in consistent fashion

- Utilize the "End Statement"
  - I was recommended to include the final remark at the end of the proposal to give better impression to the evaluators
  - Highlight that….

1. The research is novel, state-of-the-art and is worthy of being funded by European Union
2. Key concept of my research in a nut shell
3. How I can help the host institution and how host institution can help me
4. How MSCA PF could benefit my career and how I can contribute to the European community

End Statement: In conclusion, a *novel* propulsion concept must be explored to preserve the *sustainability of space*. This project combines my expertise with Prof. Tajmar's group at TUD to integrate the *aerospike engine* with H_2O_2 utilizing *thermal decomposition*, compensating their weakness to their advantages. As shown above, TUD offers an unparalleled environment not only to accomplish the goals of this project but also to assist my career in *obtaining the professorship* and *integrating into European Science and Engineering community*.

Ask for help at host institution's funding support office

- **TU Dresden includes European Project Center (EPC) to support researchers applying for major funding programs**
  - Offers introductory sessions to introduce the grant
  - For selected applicants, Masterclass is offered to professionally guide through application process
  - Staffs are allocated to Masterclass beneficiaries to support the application process (allocation of content – space wise, grammar proof, suggestion for proposal representation, writing Part A1 – financial aspects, working with F&T portals)

- **Each country has National Contact Point (NCP) who assists applicants**
  - Personally, EPC staff from TU Dresden acted as a bridge between myself and the NCP
  - NCP could offer major information before the official announcement (how many applied, what is the cut-off score, status of the reserves…)

Evaluation results and cut-off scores

- Cumulative percentage of proposals above threshold…
  - Generally, you need to score within the **top 15 %** of your panel to receive the grant
  - If anyone declines the grant, the **reserve candidate of corresponding panel** would benefit
  - **Your supporting office or NPC** could provide similar information on February

	MSCA-PF-2022: Cumulative percentage of proposals above threshold, with a given score or higher (funding range marked in green)															
Number of eligible proposals	920 proposals	109 proposals	911 proposals	668 proposals	1367 proposals	138 proposals	733 proposals	1387 proposals	42 proposals	11 proposals	82 proposals	85 proposals	103 proposals	11 proposals	57 proposals	285 proposals
Cut off score for funding*	91.8	89.4	92.4	92.6	93.6	92.2	92.4	93.0	95.0	81.0	96.4	94.0	92.6	90.8	93.4	93.6
Score equal to or above	EF-CHE	EF-ECO	EF-ENG	EF-ENV	EF-LIF	EF-MAT	EF-PHY	EF-SOC	GF-CHE	GF-ECO	GF-ENG	GF-ENV	GF-LIF	GF-MAT	GF-PHY	GF-SOC
100	0.65%	1.83%	0.33%	0.90%	0.51%	0.72%	0.82%	1.15%	0.00%	0.00%	2.44%	2.35%	1.94%	0.00%	0.00%	1.75%
99	1.41%	1.83%	0.66%	1.35%	1.98%	0.72%	1.64%	2.02%	2.38%	0.00%	4.88%	4.71%	3.88%	0.00%	1.75%	2.46%
98	2.93%	2.75%	2.74%	4.04%	4.68%	2.90%	3.55%	4.25%	11.90%	0.00%	10.98%	5.88%	6.80%	0.00%	1.75%	4.91%
97	4.02%	3.67%	4.83%	5.99%	7.75%	6.52%	4.77%	6.71%	11.90%	0.00%	18.29%	9.41%	7.77%	0.00%	3.51%	7.72%
96	6.30%	4.59%	7.03%	8.23%	10.75%	9.42%	7.78%	9.66%	19.05%	0.00%	24.39%	15.29%	11.65%	9.09%	8.77%	11.58%
95	8.70%	6.42%	8.89%	11.08%	14.34%	10.87%	9.96%	12.26%	21.43%	0.00%	29.27%	17.65%	13.59%	9.09%	10.53%	15.09%
94	11.52%	9.17%	12.62%	14.52%	16.97%	13.04%	13.10%	14.92%	21.43%	0.00%	32.93%	22.35%	13.59%	9.09%	14.04%	18.95%
93	14.78%	10.09%	15.37%	16.47%	20.19%	16.67%	16.78%	17.74%	21.43%	0.00%	32.93%	27.06%	17.48%	9.09%	21.05%	22.11%
92	17.28%	12.84%	18.22%	18.86%	23.04%	18.84%	20.05%	20.55%	28.57%	0.00%	36.59%	30.59%	22.33%	9.09%	26.32%	25.26%
91	20.00%	14.68%	20.75%	22.01%	25.82%	21.74%	22.51%	22.78%	30.95%	0.00%	40.24%	37.65%	24.27%	9.09%	26.32%	27.02%
90	23.70%	15.60%	23.16%	25.75%	29.33%	26.09%	26.19%	25.16%	35.71%	0.00%	42.68%	37.65%	29.13%	18.18%	31.58%	29.82%
89	26.85%	18.35%	26.56%	28.29%	32.48%	30.43%	29.60%	27.54%	40.48%	0.00%	48.78%	42.35%	33.98%	18.18%	36.84%	31.23%
Percentage of proposals below threshold (<70)	*22.61%*	*38.53%*	*30.52%*	*21.11%*	*20.63%*	*21.01%*	*16.92%*	*33.96%*	*7.14%*	*27.27%*	*14.63%*	*12.94%*	*19.42%*	*45.45%*	*12.28%*	*25.96%*

Evaluation Summary Report

Evaluation Result

Total score: 91.20% (Threshold: 70/100.00)

Criterion 1 - Excellence

Score: **4.70** (Threshold: 0/5.00 , Weight: 50.00%)

Weaknesses:
- The experience of the co-supervisor supervising postdocs is not sufficiently justified and their number of paper publications is not very high.

Criterion 2 - Impact

Score: **4.30** (Threshold: 0/5.00 , Weight: 30.00%)

Weaknesses:
- Exploitation plan is not described with sufficient level of detail in the proposal.
- The proposal fails to adequately describe quantifiable estimates of the project impacts in specific areas.
- The impact of the results beyond the immediate scope and duration of the proposal is not formulated with sufficient detail.

Criterion 3 - implementation

Score: **4.60** (Threshold: 0/5.00 , Weight: 20.00%)

Weaknesses:
- The research aspects of the risk management plan are not justified with sufficient detail in the proposal; for example, the likelihood of some risks is not well elaborated.

ESR weakness assessment #1

- **Weakness from criterion 1 (Excellence)**
  - *"The experience of the co-supervising postdocs is not sufficiently justified and their number of paper publications is not very high"*

    Main supervisor had excellence publication background and the co-supervisor is currently undergoing habilitation (formal qualification to become professor → early stage of his academic career), which explains the **relative low number** of paper publication…

    Nevertheless, relatively low number of publication **compared to the main supervisor** implies that co-supervisor is not sufficiently justified…

    Recommendation: Don't put any information that might trigger evaluators to downgrade your proposal, unless it is absolutely necessary for the project… In my case, I could just not mention the role of co-supervisor. I mainly work with him but does not affect any content of my proposal.

ESR weakness assessment #2-1

- **Weakness from criterion 2 (Impact)**
  - *"Exploitation plan is not described with sufficient level of detail in the proposal"*

    I **did** mention the exploitation plan but evaluated that the plan was **not sufficient**.

    I mentioned that "***No patent or venue is intended*** *to be generated directly through the project*" and "*the modeling tools will be* ***freely distributed*** *through an openly accessible repository*"

    Apparently, the evaluator wanted a **clearer plan**, either for **filing a patent or for disseminating the results**, no matter what with a much greater level of detail.

    Recommendation: Use **bold** or *italic* for information that is explicitly stated in the paragraph. Even if you don't plan any exploitation, **do briefly mention** the plan to prevent deduction

Exploitation and Intellectual property management: The low-order modeling tools to predict the cooling performance of the novel concept will be freely distributed through an openly accessible repository, "Github," and measurement data shared through "DataverseNO" to enable further external research for the advancement of the field. No patent or venue is intended to be generated directly through the project. To prevent any conflicts related to the intellectual properties between the researcher, the host, and the collaborating research institutions, my supervisors and I will be counseled by the **Transfer Offices** of TUD. In HYPER-CAT, I will assess the thermal decomposition of H_2O_2, which enables further internal research on the application of this technology beyond aerospike engines. Overall, I intend to use the results obtained in HYPER-CAT in future projects, particularly in developing a complete prototype of an H_2O_2/kerosene aerospike engine with spike-internal thermal decomposition.

ESR weakness assessment #2-2

- **Weakness from criterion 2 (Impact)**
  - *"The proposal fails to adequately describe quantifiable estimates of the project impacts in specific areas"* … and…
    "The impact of the results beyond the immediate scope and duration of the proposal is not formulated with sufficient detail"

    This is the **trade-off** between **including all required elements** and **providing sufficient detail**, caused by the **10-page limit of the proposal**

    Also, providing quantifiable estimates might give the evaluator the impression that the proposal is overly ambitious and unfeasible

    Recommendation: Manage the volume of your contents so that you satisfy the minimum level of detail while mentioning all that are required → Very subjective to evaluator

ESR weakness assessment #3

- **Weakness from criterion 3 (Implementation)**
  - *"The research aspects of the risk management plan are not justified with sufficient detail in the proposal; for example, the likelihood of some risks is not well elaborated"*

  This is also the **trade-off** between **including all required elements** and **providing sufficient detail**, caused by the **10-page limit of the proposal**

  Risk management was explained in **table (to save the space)**, at the cost of the detail. Considering the nature of the research (experiment with many/severe risks), the full explanation would not only **sacrifice space but also lead to poor evaluation**

  Recommendation: Perhaps, reduce the number of risks and better explain them in detail.. (3 to 4 risks)

Table 7. Risks associated with this action and mitigation measures

Risk (Likelihood / Impact)	WP	Proposed mitigation measures
Administrative delay (Low / Low)	1-6	Institutional proceedings prepared by TUD ahead of the project (visa, accommodations, contracts, etc.). Shift the date of the start of the project is necessary (up to 12 months)
Covid19 or a similar pandemic situation (Medium / Medium)	1-6	Remote access and work at home. Reschedule experiments and research activities. Adjust CDP if necessary
Conflicts due to sickness (Low / Low)	1-6	Remote access and work at home. Reschedule experiments and research activities
Failure to acquire components or to integrate the propellant feeding systems (Low / Medium)	5	Reuse existing supply line and its components to rearrange it for use in compatible propellant Consult with the supervisors ahead of the project start for ordering and shipping moderation
Delay in additive manufacturing of porous samples and spike module (Low / Medium)	5	Consult with experts at Fraunhofer IWS to solve the issues (change of materials or manufacturing specifications: porosity, surface roughness, etc.)
Failure to acquire components or to integrate the visualization systems (Low / Medium)	5	Inquire the Dresden concept partners for acquiring costly instruments (high-speed camera). Change of LED spectrum and corresponding optical filter
A thermal explosion of H_2O_2 vapor inside the vitiated-air heater (Low / High)	1	Remote monitoring and control of test facility. Polycarbonate shield for fragments protection. SOP confirmation and on-site monitoring of staff for every experiment
Conflicts and Resolutions (Low / Low)	1-3	Regular meetings with the supervisor to discuss upcoming problems. The CDP will be adjusted as needed.
Delay of Deadlines (Low / Medium)	4	Extension of deadlines will be discussed with the supervisor and EPC

After you are selected… Financial and personal aspects

- **MSCA PF is indeed one of the most highly paying fellowship in Europe**
  - You must know that the salary that is written is not what you are getting! (**TAX**)
  - If you have family, you would receive **living + mobility + family allowance = Gross amount**
  - Gross amount – Your tax – **Institutional contribution** = **Net salary** (What you will get)
  - **Institutional contribution**: Health insurance/Pensions that host institution must pay for you (which is taken from the project fund….)
  - In case of my case (Germany with family and a baby),…

    Gross amount: 5080 + 600 + 660 = 6340 EUR
    My tax: ~1600 EUR
    Institutional contribution: ~1200 EUR
    Net income: ~ 3600 EUR (+ Kindergeld)

  - Consider the rent and necessary expenses wisely, as the living cost in Europe rapidly increased over the last few years

- **You can postpone the start of your fellowship!**
  - I started my fellowship in May 2024 (with MSCA PF 2022) – Beneficial if you are currently involved in major project or family occasion…

Good luck with your applications!

Email: suk_min.choi@tu-dresden.de