



Mackay-Lassonde Building, Room M-4101
Polytechnique Montréal
Campus of the University of Montreal

Mailing address
C.P.6079, Station Centre-ville
Montreal (Quebec) Canada
H3C 3A7

Giovanni Beltrame

Full Professor

Computer and Software Engineering Department

☎ (514) 340-4711 ext. 4842

✉ giovanni.beltrame@polymtl.ca

<https://mistlab.ca>

Montreal, February 23, 2026

To: ESA Human Resources

European Space Agency

ESTEC, Noordwijk, The Netherlands

Re: Support Letter for Théo Gachet – ESA Graduate Trainee Positions

Dear Members of the Selection Committee,

I am writing to provide my strongest support for Théo Gachet's applications to the following ESA Graduate Trainee (EGT) positions:

1. **EGT in Scientific Deep Learning** (Advanced Concepts Team)
2. **EGT in Artificial Intelligence Applied to Mission Safety-Critical Systems** (PA&S Team)
3. **EGT in AI/Machine Learning Software Engineering**

As a Full Professor at Polytechnique Montréal and Director of the MIST Laboratory (Making Intelligent Systems Team), I have supervised Théo's Master's thesis research since September 2024. I also hold significant experience with ESA, having worked as a microelectronics engineer at ESTEC from 2006 to 2010, and having recently participated in the ESA-ESRIC Space Resources Challenge. This dual perspective allows me to assess Théo's qualifications with a clear understanding of the demands and expectations at ESA.

Academic and Research Excellence. Théo is pursuing a double Master's degree in Artificial Intelligence (Polytechnique Montréal) and Computer Science (Mines de Saint-Étienne), maintaining a perfect 4.0/4.0 GPA and ranking first in both programs. His Master's thesis, "*Uncertainty Quantification and Multimodal Semantic Fusion for Safety-Critical Space Rover Navigation in Extraterrestrial Environments*," is conducted jointly at my MIST Lab and the Mila – Quebec AI Institute, one of the world's leading AI research centers. His work addresses fundamental questions at the intersection of deep learning theory and safety-critical autonomous systems, developing principled uncertainty quantification frameworks for semantic segmentation in unstructured planetary environments.

Exceptional Fit for the EGT in Scientific Deep Learning (ACT). I believe Théo is an outstanding candidate for this position in particular. The Advanced Concepts Team seeks researchers with a strong theoretical grounding in machine learning who can contribute to geometric deep learning, physics-informed architectures, and uncertainty-aware probabilistic methods. Théo's thesis work directly addresses several of these areas: he develops novel uncertainty quantification frameworks that integrate domain knowledge and physical constraints into deep learning pipelines – precisely the kind of hybrid approach that the ACT values. His strong mathematical foundations (two years of intensive scientific preparatory classes at Lycée Saint-Louis, followed by rigorous coursework in optimization, statistical learning theory, and reinforcement learning)

give him the analytical depth required for the theoretical research conducted at the ACT. Furthermore, his proficiency in Python, PyTorch, and C++ aligns perfectly with the team's technical requirements, and his demonstrated ability to produce publishable research (his work at ESA on risk-aware path planning has been accepted at the IAA 2025 Conference on AI for Space) confirms that he can deliver results in the demanding ACT research environment.

Proven ESA Experience and Space Domain Knowledge. Théo already has direct experience at ESA, having completed a five-month internship in the Software Systems Division at ESTEC (April–August 2024), under the supervision of Luis Mansilla Garcia. During this internship, he developed a novel uncertainty quantification framework for generating coherent risk maps for semantic segmentation, and integrated calibrated uncertainty outputs to enable robust risk-aware navigation in unstructured planetary environments. This work resulted in a peer-reviewed publication. His familiarity with ESA's working culture, technical standards, and collaborative environment means he can contribute productively from day one.

Relevance to Safety-Critical Systems and ML Engineering. For the EGT in AI Applied to Mission Safety-Critical Systems, Théo's thesis is centered precisely on safety-critical autonomy for space rovers, addressing uncertainty quantification, anomaly detection, and risk-aware decision-making – all core themes of this position. For the EGT in AI/ML Software Engineering, his end-to-end experience building ML pipelines, combined with his strong software engineering skills and his upcoming internship at the Caisse de Dépôt et Placement du Québec (CDPQ) on NLP and ML pipelines for quantitative finance, demonstrate his ability to develop and deploy AI models in operational settings.

Personal Qualities. Beyond his technical abilities, Théo is a highly motivated and intellectually curious researcher with excellent communication skills in French, English, and Italian, a significant asset in ESA's bilingual working environment. He has demonstrated leadership as Vice President of PolyFinances, managing a team and a portfolio exceeding \$100k. His multiple first-place finishes in competitive hackathons (AWS AI Hackathon, PolyHacks) attest to his ability to deliver innovative solutions under pressure.

In summary, Théo Gachet combines exceptional academic credentials, directly relevant research expertise, proven ESA experience, and the intellectual maturity needed to thrive in any of these three EGT positions. I recommend him without reservation, with particular emphasis on his fit for the Scientific Deep Learning position within the Advanced Concepts Team.

Please do not hesitate to contact me if you require any additional information.



Giovanni Beltrame

Full Professor

Director, MIST Laboratory

ASTROLITH Lunar Engineering Research Unit

MAPAQ Chair in Robotics for Plant Protection

Polytechnique Montréal