

Training opportunity for graduates/young professionals from Switzerland

Reference	Title	Duty Station
CH-2020-TEC-MME	Future Quantum Payload Designs for Space	ESTEC

Overview of the unit's mission:

The TEC-MME section is part of the Directorate of Technology, Engineering and Quality, and situated in the European Space TEchnology Centre (ESTEC) in Noordwijk, the Netherlands. ESTEC is the technology hub of the European Space Agency ESA.

Some of the duties that the Opto-electronics (TEC-MME) Section performs are:

- Provision of specialised support to feasibility and project-definition studies, preparatory programmes and approved projects;
- Promotion of technology with high performance/cost ratio to enhance the competitiveness of European industries in the field of space opto-electronics

For what concerns the activity to be proposed, the following technologies are involved:

- Laser and laser sensor developments including optical frequency metrology and time and frequency Distribution
- Optical communication system techniques
- Photonics technologies and applications including integrated (waveguide) photonics
- Quantum enhanced metrology which is realised in applications such as Matter Wave Interferometry (MWI), Optical Atomic Frequency Standards (OAFS) and Quantum enhanced Optical Communications
- Technology sub-system developments as pre-cursors to possible near-term flight opportunities as, science-driven, small satellite payloads

Overview of the field of activity proposed:

The proposed project under the Swiss Trainee program would be the development of an end-to-end simulation mechanism using several identified software tools to achieve the key steps of the process; CAD model of sub-system, detailed FEA analysis of design after adequate parameterisation, virtual environmental testing followed by design update/s.

We propose to use an existing optoelectronic sub-system design as a wholly representative element, from a high-resolution FEA model through virtual environmental testing and subsequently right through to product life-cycle management.

The next logical step would be to manufacture and environmentally test the sub-system for compatibility with the model. We have identified several viable ongoing developments within TEC-MME, which we can use for this purpose.

The field of activity in this proposal will be system engineering modelling and verification of small payloads for demonstration on small satellite platforms. The proposed project steps would assist ESA, and its industrial contractors, in the process of identifying an improved system design via iterative design steps to ensure a sub-system element meeting pre-determined performance specifications. Further, it would enable ESA a more rapid delta development plan to test and verify the sub-system component on a Small Satellite (SmallSat) platform in a controlled process under vastly reduced cost.

- Sub-system design (3D CAD)
- Analysis (FEA)
- STK (Orbital conditions and Space environment parameters)
- Manufacturing (3D printing or conventional Process)
- Life-cycle management (dedicated tool)

The list of tools is not exhaustive but should be selected to adequately anticipate, and mitigate, the changes to the key design parameters as a result of environmental perturbations.

We would anticipate additional collaboration and expertise from the thermal and structural colleagues in the TEC-M department to adequately cover all aspects of this project.

You are encouraged to visit the ESA website: www.esa.int/esa



Required education:

- Master-level degree in Engineering (electronic/mechanical/aerospace)
- Capability in system modelling and related software engineering
- Demonstrated interest in small space hardware development, from a system engineering point of view would be a definite asset
- Good interpersonal and communication skills;
- Ability to work in a multicultural environment, autonomously and as part of a team;
- Fluency in English and/or French, the working languages of the agency