Training Opportunity for Swiss Trainees

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<th>Reference</th>
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<th>Duty Station</th>
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<td>CH-2017-TEC-EST</td>
<td>Low Complexity Optical LEO-to-ground Links</td>
<td>ESTEC</td>
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**Overview of the unit's mission:**

The section's technical expertise is system engineering of satellite-based telecommunication links. More specifically the section is responsible for the development of advanced Telecommunication systems, techniques and technologies for broadband, broadcast and mobile SatCom applications as well as for Telemetry, tracking and control (TT&C), Payload Data Transmission (PDT) and Space Link communications.

**Overview of the field of activity proposed:**

In the frame of the inter-agency Consultative Committee for Space Data Systems (CCSDS) Optical Working Group, a standard is being developed targeting LEO direct-to-ground downlinks of low complexity.

In this context, low complexity refers to robust and low cost solutions exploiting proven technology from terrestrial fiber communications systems. Such link scenarios need to support a wide variety of data rates due to the varying link budget as a result of the varying link geometry.

The proposed activity will consist of designing and simulating various modulation and coding options for the low complexity LEO direct-to-ground scenario. Despite being low complexity, advanced coding schemes used in RF systems (such as serial concatenated convolutional codes) can bring significant performance gains and allow operation down to very low elevation angles. In addition, the atmospheric effects that manifest themselves in the form of turbulence require the combination of the channel coding with symbol interleaving, or equivalent means to avoid erasures.

The results of the activity will be exploited in the form of inputs into the CCSDS Optical Working Group, and also for driving optical modem technology developments.

**Required education:**

The trainee shall be a graduate student with a major on telecommunication systems, ideally also possessing a Masters in this field. Familiarity with communication systems computer simulations using typical software tools (such as C++ or Matlab) is highly desirable.