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## DLR – DAAD – Fellowships

Fellowship - No. 360

**Research Area :** Aeronautics  Space  Transportation  Energy

**Research Topic:** **Accurate, low-cost temperature measurements in radiative high pressure environments for RQL-gas turbine combustors**

**DLR Institute:** **Institute of Propulsion Technology, Combustor Department,  
DLR Cologne**

**Position:** Doctoral Fellow  Postdoctoral Fellow  Senior Scientist

**Openings:** 1

**Job Specification:** The research activities of the Combustor Department at the Institute of Propulsion Technology of the German Aerospace Center (DLR) in Cologne focus primarily on the experimental investigation of pollutant formation and combustion instabilities in gas turbine combustors under realistic operation (pressure and temperature) conditions. These two aspects are obviously of fundamental importance for the design of modern aeroengines. The Rich-Quench-Lean (RQL) technology has a good potential for stable and safe operation at reduced NO<sub>x</sub> emissions and high efficiency, which means, in turn, a reduced CO<sub>2</sub> footprint. Especially important for an optimal design of RQL-combustors is the possibility of effectively controlling the fuel placement and hence the turbulent mixing in the primary zone so as to favourably influence the formation of particulate matter. This objective can only be achieved through a deep understanding of the role that geometrical (such as injectors typology and aerodynamics) as well as aero-thermodynamic factors (e.g. turbulent mixing, temperature and pressure) play and how these influence the soot formation and oxidation processes. In particular, the effects of the pressure have been observed to be highly non-linear, so that results obtained from measurements carried out at atmospheric pressure cannot be directly extrapolated to the operating conditions which are typical of a large civil aeroengine (about 40 bars).

This requires therefore highly complex experiments in an environment which retains most of the complexity of real configurations whilst allowing the deployment of non-intrusive (optical), high-fidelity measurements techniques.

As the operating conditions which need to be examined become increasingly more demanding and accuracy requirements more stringent, it is of paramount importance to be able to pre-assess the viability of various measurement techniques and their combination together with the necessary experiment design.

In close cooperation with our staff scientists and test rig engineers, different options for accurate temperature measurements in highly sooting, strongly radiating environments at high pressure will have to be evaluated and pre-validated on the basis of virtual tests before being applied to a real test configuration. For this purpose, the Institute of Propulsion Technology offers a 3-month DLR-DAAD bursary for an internationally renowned senior scientist who shall carry out this research within the Department.

**Required Qualification:** The ideal candidate will have a proven, internationally acknowledged track record in experimental combustion research with special focus on gas turbine combustors, temperature measurements in reacting flows, measurements of soot and particulate in flames at high pressure and temperature. He/she will hold a senior position (e.g. full professorship) at a leading international research institution and have a strong motivation for conducting research in a highly challenging environment.

**Advantageous Skills:** Competence in laser-based combustion diagnostics, e.g. Laser Induced Grating Spectroscopy (LIGS), high spatial resolution absorption measurements of soot in flames, CO and NO imaging measurements. Basic knowledge of the German language would be advantageous.

**English competence:** fluent/mother tongue

**Earliest Start Date:** February, 1<sup>st</sup>, 2019

**Application Deadline:** until position filled

**Further Information:** <http://www.dlr.de>  
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