Imperial College London
Department of Mechanical Engineering
PhD Studentship in “Lubricant-induced Low Speed Pre-Ignition (LSPI) Mechanism”

Applications are invited for a research studentship in the field of combustion in Direct-Injection Spark-Ignition internal (DISI) combustion engines leading to the award of a PhD degree. The research is sponsored by a bursary and fees (at UK/EU student rate) provided by an EPSRC Industrial CASE award in collaboration with BP Technology Centre. Note that only UK and EU candidates are eligible.

Project Description

Modern highly efficient Spark-Ignition engines feature boosting, fuel direct-injection, late combustion and low piston-ring tension to deliver improved overall efficiency and reduced emissions. However, all of these characteristics increase the propensity for Low Speed Pre-Ignition (LSPI) in the cylinder of DISI engines, which can lead to destructive mega-knock. Droplets of lubricant or particles of combusted lubricant are considered the source of LSPI. This collaborative project will aim to characterise and understand the physical and chemical properties of droplets/deposits. Experiments will be conducted in a high pressure and temperature combustion research unit. Parametric study of ignition characteristics by varying the physical and chemical properties of droplets will be conducted with the objective to produce a ranking of all the lubricant components with regards to their LSPI performance. The project will also assess the reaction mechanism of metal-based deposits. The outputs from the collaborated PhD project will provide insight on lubricant and fuel formulation to meet future stringent emission requirements from industry and OEMs. The research will be performed in the Thermofluids Division, which has an internationally leading record, established over many decades, in pure and applied research in combustion, multiphase flows and heat and mass transfer. Internationally unique advanced laser diagnostics developed in-house will be used for the experimental characterisation of underlying physics.

You will be an enthusiastic and self-motivated person who meets the academic requirements for enrolment for a PhD degree at Imperial College London. Ideally you will have a 1st class honours degree in an engineering subject or physics and an enquiring and rigorous approach to research together with a strong intellect and disciplined work habits. A keen interest in laser diagnostics and physics of combustion is essential. Good team-working, flexibility, observational, practical and communication skills are essential for this project, which will also involve collaboration with scientists at the BP laboratories.

To find out more about research at Imperial College London in this area, go to:
http://www3.imperial.ac.uk/mechanicalengineering

For information on how to apply, go to:
http://www.imperial.ac.uk/mechanical-engineering/study/phd/how-to-apply/

For further details contact Prof Yannis Hardalupas (email: y.hardalupas@imperial.ac.uk), tel: +44 (0)20 75947057. Interested applicants should send an up-to-date curriculum vitae to Prof. Hardalupas. Suitable candidates will then be asked to complete an electronic application form at Imperial College London in order for their qualifications to be addressed by College Registry.

Closing date: until post filled

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Committed to equality and valuing diversity. We are also an Athena SWAN Silver Award winner, a Stonewall Diversity Champion, a Two Ticks Employer, and are working in partnership with GIRES to promote respect for trans people