

## Research Student Project

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<b>Research Centre Name and Website</b>	<ul style="list-style-type: none"> <li>• <a href="#">Dublin Energy Lab (DEL)</a></li> <li>• <a href="#">Environmental Sustainability and Health Institute (ESHI)</a></li> </ul> <p style="margin-left: 20px;"><b>In collaborations with</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Fluids and Heat Transfer Group, Trinity College Dublin</a> (Prof. Anthony Robinson and <a href="#">Dr. Seamus O'Shaughnessy</a> as co-supervisors)</li> </ul>				
<b>Please indicate if the intention is to transfer from the Masters programme to the PhD programme (if applicable)</b>	n/a				
<b>Funding Arrangements</b>	<input checked="" type="checkbox"/> <b>Fully Funded</b> (ie Scholarship, Fees & Materials funding available)  <input type="checkbox"/> <b>Self-Funded</b> (Scholarship not available. Fees & Materials to be paid by the student. Materials costs <i>not</i> significant)  <input type="checkbox"/> <b>Non-Funded</b> (Scholarship not available. Fees & Materials to be paid by the student. Materials costs <i>are very</i> significant)				
<b>Funding Agency</b>	Technological University Dublin Research Scholarship Programme				
<b>Funding Details (up to a maximum of 4 years)</b>	<table style="width: 100%; border: none;"> <tr> <td style="width: 60%;">Student Stipend</td> <td style="text-align: right;">€ 16,000 p.a.</td> </tr> <tr> <td>Materials/ Travel etc</td> <td style="text-align: right;">€ 2,000 p.a.</td> </tr> </table>	Student Stipend	€ 16,000 p.a.	Materials/ Travel etc	€ 2,000 p.a.
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<b>Subject Area</b>					
<b>Title of the Project</b>	Combined Influences of Electric Fields and Wettability on Contact Line Evaporation of a Sessile				

	Droplet in Microgravity for Novel Space and Ground Applications
<p><b>Project Description</b></p> <p>Droplet evaporation is of significant scientific and engineering interest. It represents a common natural phenomenon that is not fully understood yet is used in many industrial fields, ranging from DNA mapping, ink-jet printing, surface patterning to evaporative spray cooling.</p> <p>Heat and mass transfer near the triple contact line region of an evaporating droplet is a complex phenomenon. Albeit a proportionately small region compared with the droplet size, the wetting physics at the contact line is crucial in defining the static and dynamic mechanics of evaporating droplets. The contact line is a key area that requires significant research to fully understand droplet evaporation, particularly with the inclusion of external field effects such as electric fields in combination with other effects such as wettability. The progress to full understanding is hampered by a general shortfall in robust simulation-based research in this field, addressed by this project.</p> <p>This project proposes a numerical-experimental investigation of the heat and mass transfer to an evaporating hydrophilic water droplet. The latest advancements in Computational Fluid Dynamics in two-phase flow and heat transfer will be utilized. Initially, the model will be created in either of the prevalent Computational Fluids Dynamics packages (Ansys and COMSOL). It will later be developed using open-source software (Open FOAM), operated remotely on a high-end computing cluster.</p> <p>Numerical predictions will be experimentally validated with thin-foil thermography and droplet shape analysis. The recently developed state-of-the-art experimental setup will be used to carry out the experiments on the ground and in microgravity (on parabolic flights).</p> <p>The validated numerical tool will be used for the high-fidelity interpretation of the experiment data. The impact of electric fields and gravity on the convective heat transfer to evaporating hydrophobic and hydrophilic droplets will further be examined in microgravity and on the ground conditions.</p>	
<p><b>Student requirements for this project</b></p> <p>Minimum of a 2.1 honours degree (level 8) in a relevant discipline</p> <p>Please review detailed Admission Requirements at <a href="#">TU Dublin GRADUATE RESEARCH REGULATIONS</a></p>	
<p><b>Deadline to submit applications (only for funded projects)</b></p>	<p>31/03/2020</p>

If you are interested in submitting an application for this project, please complete an [Expression of Interest](#) and email it to [phd@tudublin.ie](mailto:phd@tudublin.ie).