Position Title	PhD Studentship in: Liquid Cooling and the Future of 5G Networking Technologies
Project Abstract	5G networking technologies offer exciting new possibilities for businesses and consumers. Faster speeds and reliable connectivity will pave the way for the future development of the IoT, autonomous vehicles and virtual reality. As the 5G network continues to develop, efficient thermal management of the different infrastructure required for this next generation network, poses a major challenge to industry. In order to ensure the reliability, speeds and flexibility a range of different systems such as lasers, cell tower cabinets and small cells etc. need effective cooling solutions. Small cell devices are required for 5G to transmit data in addition to the larger traditional higher-powered 'macro' cells. A crucial component in these cells is the power amplifier (PA) for RF transmission. PAs are small (~1cm^2), semiconductor devices that dissipate large amounts of heat (of order 10-10^{2}W) and can operate at temperatures up to 125-150^{o}C. However, these cells also feature microprocessors, FPGAs and passive devices which have temperature limits of ~85^{o}C, making the overall thermal management of these systems a crucial factor in the successful development of 5G technology. Traditional thermal management solutions favour forced convective air-cooling, however for high heat flux situations there is an increasing shift towards liquid cooling or hybrid liquid-air cooling. At UL, we are working on developing cooling solutions employing multiphase and liquid-liquid Taylor flows. Taylor flows are unique flow regimes where two immiscible fluids are present within a channel and form discrete slugs or droplets. Studies investigating their thermal performance have reported significant enhancements in heat transfer, compared to single-phase flows. This project will focus on the design and experimental validation of a liquid cooling system at chip level for use in 5G cells. The PhD is offered in collaboration with Prof. Ed Walsh at the Department of Engineering Science at the University of Oxford.
Location	The successful applicant with join Stokes Laboratories in the Bernal Institute located at the University of Limerick.
Experience	The PhD position is funded for 4 years (UL's Structured PhD Programme), including a monthly stipend and a travel budget to present at international conferences and attend relevant training courses. Applicants should have the following: ▪ B.E., M.E. or M.Sc. or equivalent in Mechanical Engineering or a closely related engineering or science discipline.

	▪ Excellent academic performance (first-class honours or equivalent). ▪ A strong interest in heat transfer/fluid mechanics, previous research experience is desirable. ▪ Very good level of spoken and written English.
Funding / Stipend	The studentship will cover fees up to 5,500k pa and a stipend of 18,500k pa
Closing Date	Friday 15th June 2018
Contact	Dr. Vanessa Egan, School of Engineering, University of Limerick
Application Process / Additional Information	Interested candidates should apply to Dr. Vanessa Egan, email: vanessa.egan@ul.ie. Early applications are encouraged. Applications should include: 1) a cover letter (1 page) explaining their interest in the project topic and mentioning any relevant background and/or experience; 2) a Curriculum Vitae. Academic transcripts and two academic references will be required after a shortlisting process takes place. Additional information can be found at https://connectcentre.ie/, http://stokes.ie/ and http://scieng.ul.ie/about-the-bernal-project.