

PI name & contact details:	Paul Eastham, easthamp@tcd.ie	
School:	Physics	
<i>Has project been agreed with head (or nominee) of proposed registration school?</i>		
Research Centre / group affiliation:	Condensed matter theory and photonic systems	
Research group / centre website:	http://www.tcd.ie/Physics/People/Paul.Eastham and http://www.tcd.ie/Physics/phonics	
PI website / link to CV:	http://www.tcd.ie/Physics/People/Paul.Eastham	
Brief summary of PI research / research group / centre activity (2 or 3 lines max): We develop theories describing the physics of electrons and photons in semiconductor nanostructures, and work closely with experimental colleagues in TCD photonics and elsewhere to develop, test, and apply them.		
Title & brief description of PhD project (suitable for publication on web): Theory of polariton lasing in photonic structures. Polariton lasing is a fundamentally new type of lasing, discovered in 2006 in a semiconductor nanostructure. It is based on the stimulated scattering not of photons, but of polaritons – part-matter, part-light quasiparticles. The aim of this project is to develop computational and analytical models of polariton lasing in arbitrary dielectric structures, such as waveguides and photonic crystals, leading to the design of new types of nanoscale light emitter, and helping explore the physics of a new state of matter and light.		
Unique selling points of PhD project in TCD: <i>projects should offer something that's not available in Brazil – specific equipment, multi-disciplinarity, aspects of structured programme, links with industry, placements, links with other research groups etc.</i> The Trinity PhD is a structured PhD and students can access discipline-specific training, as well as generic and transferable skills. All PhD students are eligible to participate in the Innovation Academy which offers a Postgraduate Certificate in Innovation and Entrepreneurship to assist PhD students identify and exploit the value within their research. The project will provide the student with a unique blend of expertise spanning both theoretical condensed matter physics and the modelling of photonic devices (in demand for both pure science and technology), as well as opportunities to apply this expertise to emerging experiments, in TCD photonics, and in leading European and U.S. groups with whom we have established collaborations.		
Name & contact details for project queries, if different from PI named above:		
Please indicate the graduates of which disciplines that should apply: Physics (with strong mathematical and/or computational skills)		
Ciência sem Fronteiras / Science Without Borders Priority Area: <i>Please indicate the specific programme priority area under which the proposed PhD project fits- choose only one (tick box):</i>		
Engineering and other technological areas		
Pure and Natural Sciences (e.g. mathematics, physics, chemistry)		x
Health and Biomedical Sciences		
Information and Communication Technologies (ICTs)		
Aerospace		
Pharmaceuticals		

Oil, Gas and Coal	
Renewable Energy	
Minerals	
Biotechnology	
Nanotechnology and New Materials	
Technology of prevention and remediation of natural disasters	
Biodiversity and Bioprospection	
Marine Sciences	
Creative Industry	
New technologies in constructive engineering	