| PI name & contact details: | Prof. Vojislav Krstić  
e-mail: krsticv@tcd.ie |
<table>
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<tr>
<td>School:</td>
<td>School of Physics</td>
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<tr>
<td>Has project been agreed with head (or nominee) of proposed registration school?</td>
<td>Yes</td>
</tr>
<tr>
<td>Research Centre / group affiliation:</td>
<td>Centre for Research on Adaptive Nanostructures and Nanodevices</td>
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<tr>
<td>Research group / centre website:</td>
<td><a href="http://www.crann.tcd.ie">www.crann.tcd.ie</a></td>
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<tr>
<td>PI website / link to CV:</td>
<td><a href="http://www.crann.tcd.ie/Research/Investigators/School-of-Physics/Prof-Vojislav-Krstic.aspx">www.crann.tcd.ie/Research/Investigators/School-of-Physics/Prof-Vojislav-Krstic.aspx</a></td>
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**Brief summary of PI research / research group / centre activity (2 or 3 lines max):**
Research on electronic transport, magnetoelectrical and -optical properties in novel nanosized and nanostructured materials, comprising magnetic-field- and temperature-dependent experiments. Materials investigated: Ge & InAs nanowires, graphene, chiral nano-metals, carbon nanotubes

**Title & brief description of PhD project (suitable for publication on web):**
**Title:** “Magnetoresistance in graphene with ferromagnetic superstructres”

The relativistic character of charge-carriers in graphene is a key-property for this material to be identified as a high potential candidate for electronic applications replacing and complementing existing state-of-the-art semiconductor-based platform technologies. Superstructuring of graphene opens the pathway to the exploitation of these relativistic properties specifically if the spin degree-of-freedom is addressed, too. Hence, magnetic superstructuring of graphene provides a way to develop electric-field tuneable spin-current splitters, low-dissipative THz rectifiers and novel magnetoresistive sensors. Within this framework, the longitudinal and transverse resistance of superstructured graphene is to be determined for DC and AC currents as a function of gate, temperature, and magnetic field. This project implies experimental work in nano-device fabrication of superstructured single-layered graphene, Raman-microscopy, and electrical measurements without and with magnetic fields within the temperature range from 300 K down to a few ten mK.

**Unique selling points of PhD project in TCD:**
- the candidate will be exposed to current state-of-the-art lithography techniques and techniques for electrically contacting a wide range of nano-materials
- the candidate will work in the newly emerging field of 2D magnonics and 2D magnonic crystals
- the candidate will work on a state-of-the-art dry cryogenic system with integrated superconducting magnet and be trained in the cryogenic and vacuum techniques. The PI's laboratory is the first and only laboratory in Ireland with such a system and the expertise to carry out experiments in such ones on single nano-objects
- the candidate will work on questions related to industrial needs in the field of resistive sensors
- the candidate will be supported by the hosting PI in participating in the Innovation Academy

**Name & contact details for project queries, if different from PI named above:**
-/-
Please indicate the graduates of which disciplines that should apply:
Physics
Electrical Engineering
Materials Science
Nanoscience

Ciência sem Fronteiras / Science Without Borders Priority Area:
Please indicate the specific programme priority area under which the proposed PhD project fits - choose only one (tick box):

- Engineering and other technological areas
- Pure and Natural Sciences (e.g. mathematics, physics, chemistry)
- 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