# PhD Studentship:

Experiments of rain droplet penetration of porous media using laser diagnostics

University of Southampton

Qualification Type:	PhD
Location:	Southampton
Funding for:	UK Students, EU Students
Hours:	Full Time

Supervisor: Tiina Roose
Co-supervisor Bharath Ganapatrisubramani

Soil is one of the most complex self assembling organo-mineral composites in the world. All human food supply, ecosystem and infrastructure services depend on soil. However, surprisingly, especially for the UK, very little is known about the fundamental fluid dynamics
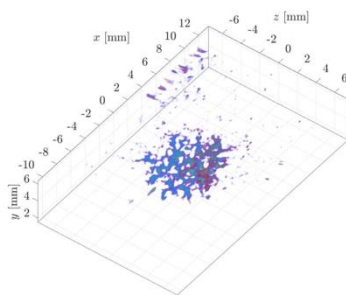
of how the rain penetrates soil and influences the soil wetting and soil surface mechanics. There are many crude and mostly inaccurate modelling approaches available, but there is no fundamental understanding of how raindrops of different sizes penetrate soil pore space. However, this knowledge is needed to predict how the solutes applied to the soil surface get carried deeper into the soil with rainfall.

In this PhD project, the candidate will design, develop and carry out tailored canonical experiments of droplets with different sizes penetrating a variety of porous media. High-fidelity laser diagnostics will be carried out in state-of-the-art refractive index matched facilities that will allow us to measure within and around porous media This will provide access to previously inaccessible data that can be used to develop new models, which in turn can be used within a larger predictive framework. These experiments will not only aid our model development for rain penetration into soil, but also enable us to advice what mist/rain sprinkling will best aid or impede solute movement into soil.

The candidate should have a first-class degree in a general Engineering area (Mechanical, Aerospace, Chemical etc) or Applied Mathematics. You should have the interest and some experience in carrying out experimental work. Laser diagnostics experience is preferred but not a requirement. A strong mathematical and computing (MATLAB, PYTHON etc.) foundation is necessary for development of data analysis codes and subsequent model synthesis.

If you wish to discuss any details of the project informally, please contact Tiina Roose, Bioengineering Sciences Research Group, Email: t.roose@soton.ac.uk, Tel: +44 (0) 2380 59 2374.