PostDoc Job Opportunity

DUBLIN CITY UNIVERSITY	First Name	Last Name	email	Institute	Address
PI name & contact details:	John	Costello	John.costello@dcu.ie	DUBLIN CITY UNIVERSITY	Glasnevin, Dublin 9, Ireland.
School:	Physical Sciences				
Research Centre / group affiliation:	National Centre for Plasma Science and Technology				
Research group / centre website:	Laser Plasma and AMO Physics - www.physics.dcu.ie/~jtc				

Brief summary of research group / centre activity:
Our group is focused on the interaction of fast and ultrafast laser interactions with matter from gases to solids. We have a suite of well-equipped laboratories with nanosecond, picosecond and femtosecond laser systems along with high resolution spectrometers and scientific grade CCD and ICCD cameras extending from the NIR to the XUV for spectral readout and/or imaging - www.physics.dcu.ie/jtc/expfacil.html . We are also part of a major consortium carrying out experiments at world leading X-ray Free Electron Lasers in Italy, Germany and the USA.

Description of postdoctoral project on offer:
When a high power laser is focused onto a solid or liquid, a dense and hot plasma is rapidly formed and expands quickly to form a bright plume of atoms and ions and even molecules and nanoparticles (NPs) as it cools and the atomic constituents condense. It is well known that femotsecond laser produced plasmas favour the formation of nanoparticles. However, with appropriate design, nanosecond laser produced plasmas formed in e.g., liquids or in colliding plasma plume experiments also favour the production of NPs. The main aim of the project is to study the formation and evolution of NPs in fs and ns laser plasmas in liquid and colliding plasma-gas environments. In contrast to the usual study of NPs deposited on substrates dynamic laser scattering such as Rayleigh Scattering (RS) and Photoluminescence (PL) in situ from the plasma plume in each environment will be employed. Laser and target parameters will be tuned to optimise NP formation and techniques such as 'NP slicing' with a third synchronised laser system will be used to narrow the size distribution. Such NPs have many applications but we are particularly interested in how these system could be integrated with analytical science techniques such as LIBS and ICP-MS (perhaps even MALDI or LIAD) to improve the limits of detection (LOD) of LIBS and ICP-MS. Experiments will be perfomed with both ns and fs laser systems. Harmonics of Nd-YAG lasers and an OPO will be used for plasma formation and RS, PL and other measurements such as shadowgraphy. Laser scattering will be complemented by fast ICCD imaging and optical emission spectrometry.

Please indicate the core skills or disciplines that are required for this position:
Candidates need to have a strong formation in high peak power laser systems (Q-switched and modelocked) and their interaction with matter, especially plasma formation in laser solid interactions. A proven ability to design and build up experiments including laser, timing and synchronisation, optical, vacuum, ICCD imaging and spectrometric systems is expected. They would also need a good background in atomic and molecular physics and be able to read and interpret spectra . Some knowledge and/or experience of laser plasma modeling with one or more of the many codes such as Medusa, Helios, etc. would be desirable but not essential.