Modelling radiation damage in cellular systems

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Description: This project provides an opportunity to work in the field of radiation damage in collaboration with both the Portuguese led Radiation Biology and Biophysics (RaBBiT) doctoral training course and the Marie Curie Initial Training Network (ITN) ARGENT (Advanced Radiotherapy, Generated by Exploiting Nanoprocesses and Technologies). The research programme combines Physics: explaining the delivery of radiation and the physical interactions of the radiation; Chemistry: describing the chemical processes induced by the physical interactions and providing the methodology for tailoring of nanoscale agents to specific functions; Biology: elucidating the effects of chemical changes on the cells, organs and patient, assaying for damage and delivery of nanomaterials; Medicine: integrating developments into clinical cancer therapy facilities; and Business: deriving economic benefit from the discovery of nanomaterials and simulation tools to predict individual protocols. Thus the successful applicant will have the opportunity to form links and gain experience in a range of topics beyond that of their immediate research project.

This project will be focused on the development of a model for simulating the effects of radiation on cellular systems using a new and unique MBN Explorer software, http://www.mbnexplorer.com/. MBN Explorer will be used to the study of interactions between the incident radiation (X-ray or ions) and biological environment (water, DNA, proteins, lipids, etc.) with the aim of elucidating which bonds in the biomolecules are most susceptible to damage. In collaboration with other PhD students the model may then be used to explore the role different radiosensitizers in inducing such band breaks (and hence cell death) such that radiotherapy can be improved as a clinical method. This project would suit someone with an interest in and knowledge of programming and software. The student will spend some time at MBN Explorer HQ in Frankfurt to receive additional training in the use of the software.

References:


Qualifications required: A first class or upper second class MSci degree in Physics /Chemistry or related discipline. Previous experience in using and developing software will be an advantage.