2019 YCCSA SUMMER SCHOLARSHIP PROJECT SUBMISSION

This form is for prospective project supervisors to submit their projects to be included in the YCCSA Summer Scholarships Programme for 2019.

It is the purpose of the YCCSA Summer School that any projects submitted are novel and interdisciplinary in nature.

Date	***23/01/19***
Supervisors' Names and Departments / Affiliation and Contact Email	*Reidun Twarock & Eric Dykeman* *Department of Mathematics, University of York rt507@york.ac.uk ecd502@york.ac.uk* *Prof William Latham (Computing Department, Goldsmith) - w.latham@gold.ac.uk* *Dr Lance Putnam (Computing Department, Goldsmith) - L.Putnam@gold.ac.uk* *Prof Stephen Todd (Computing Department, Goldsmith) - stephentodd@gmail.com*
Project Title	***3D rendering of a viral genome organization from assembly kinetics data***
Project Description	***This project will use stochastic models to simulate the assembly of a small plant virus (STNV) around its ssRNA genome. Single-stranded RNA viruses utilize packaging signals to insure that their genomes are seletively packaged over competitor host RNAs during the assembly process. As a result, the genomes of these viruses have characteristic polyhedral orginazations which depend on the positions of the packaging signals and the shape of the capsid container. Using cryo-EM data and assembly models, the project will examine the combintorics of RNA organization in these small plant viruses and determine the characteristic polyhedral cage for STNV. The project will then link with Latham, Todd and Putnam on to create a new 3D rendering of the polyhedral genomic organization which can then be integrated into a virtual reality environment and other display techniques important for STEM outreach activites.***
Required Skills	***Background in dynamical systems and the use of numerical methods to solve ODE and stochastic systems. Some knowledge and interest in 3D rendering and display of such 3D models in a virtual reality setting.***
Supervision and Collaboration Arrangements	***Main supervision of the student will be via Reidun Twarock and Eric Dykeman. We will interface with collaborators Latham, Putnam, and Todd who will provide a novel new method for the rendering of the genome organization of STNV provided by the student.***
Project Dates	*The summer school runs for 9 weeks, starting on Monday, 08 July 2019 and finishing on Friday, 06 September 2019.*
Other Information	*Anything that doesn't easily fit above.*
References	*[1] P.-P. Dechant, J. Wardman, T. Keef & R. Twarock (2014) Viruses and fullerenes -- symmetry as a common thread?, Acta Cryst A 70:162-7.* *[2] T. Keef, J.P. Wardman, N.A. Ranson, P.G. Stockley & R. Twarock (2013) Structural constraints on the three-dimensional geometry of simple viruses: case studies of a new predictive tool, Acta Crystallogr A. 69, 140-50.*

	[3] *E.C. Dykeman, P.G. Stockley & R. Twarock (2014) Solving a Levinthal's Paradox for Virus Assembly suggests a novel anti-viral therapy, PNAS 111, 5361-5366.* [4] *P.E. Prevelige (2016) Follow the Yellow Brick Road: A Paradigm Shift in Virus Assembly, J Mol Biol. 428, 416-8.*

When complete, please email the form to sarah.christmas@york.ac.uk