Uncertainty and stochasticity in genome replication

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Background Every time a cell divides, it creates a copy of its genome in a process known as genome replication. The replication starts at the so called replication origins, but the time at which each origin *fires* (initiates replication) is stochastic. Experiments provide information about the firing times at two different levels, average firing time for an origin in a population of cells, and firing times for individual cells. The observations for individual cells are less accurate, but provide information about the distribution of firing times, whilst the population experiments are more precise but only provide information on the mean firing time.

Goals The main goal of the project is to characterise the distribution of firing times of genome replication origins, untangling the experimental uncertainty from the underlying firing time stochasticity by means of combining data from different experiments.

Student's expected contribution The student will use a range of statistical modelling techniques to build statistical models for different experimental methods, and they will use experimental data provided by collaborators to calibrate the models. The student will study the models to explore any identifiability issues for the model parameters, and they will compare the results with other modelling approaches published in the literature.

Skills required A successful candidate should have an MSc in mathematics or statistics, or equivalent, and strong interest in statistical modelling, data analysis and uncertainty quantification; coding skills in Python or R are desirable. Basic knowledge of cell biology would be beneficial but it is not a requirement.