

Optical Trapping, Stretching, and Coalescing of Protein Condensates

Institution	The University of Queensland
Project details	This interdisciplinary project aims to use optical tweezers to study the physical properties of protein condensates. These condensates have been implicated in motor neuron disorders, including Alzheimer's, Parkinson's, and Chronic Traumatic Encephalopathy (CTE). Understanding the physical properties of these condensates under different conditions should provide much-needed insight into their role in these diseases. This project involves the use of optical tweezers and structured light to trap individual condensate for stretching or for forcing merging of multiple condensates as a measurement of their stiffness. The stiffness of individual condensate is expected to vary with several parameters including their age, size, and environmental conditions. This project aims to first develop a robust method to determine the stiffness of individual condensates, followed by a systematic study to explore the influence of those parameters on the stiffness. This is an in-person project run at St Lucia campus. Students are expected to contribute to the weekly group meetings, and present their work at the end of the project.
Who can apply	2-4 th year physics or biophysics students based at the University of Queensland who are interested in gaining first hand lab experience part of an applied optics research group.
Contact / Project supervisors	Dr Mark Watson (UQ) mark.watson@uq.edu.au Co-supervisors: Emma De Costa (UoW) edc926@uowmail.edu.au Prof. Halina Rubinsztein-Dunlop (UQ)