

# NSERC USRA 2024 Proposal

## Fast computation of L-functions

### Project overview

Using the fast Fourier transform, Odlyzko and Schonhage (1988) famously devised an algorithm to rapidly calculate values for the Riemann zeta function. This efficient method has been used to calculate its zeros and verify the Riemann hypothesis up to a large height. These ideas have been furthered and extended by many authors, such as Hiary (2011, 2014, 2018) and Stopple (2007).

This project aims to apply and extend these investigations to other L-functions. There are several possible directions, such as implementing algorithms to produce data on the distribution of values or creating fast computational methods for certain families of L-functions. A solid background with complex variables and elementary number theory is strongly recommended.

First, we will analyze recent literature and proof techniques for analyzing the complexity of such algorithms. Second, we will collaboratively decide on your research path, and we will study recent techniques for your proposed investigations. Finally, you will summarize the outcomes of your research in an appropriate academic forum, so the community can use this work to guide future research.

If you are interested, please submit this form:

<https://forms.office.com/r/KkEW5G4Far>

If you have any further questions, please feel free to contact me.

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