

M E M O R A N D U M

DATE: 03/06/2025

TO: Faculty and Students

FROM: Professor(s) Steven Kaliszewski
Chair/Co-Chairs of Fan Huang
Defense for the PhD in Mathematics
Committee Members Douglas Cochran
Erik Bedos
Jack Spielberg
John Quigg

DEFENSE ANNOUNCEMENT

Candidate: Fan Huang

Defense Date: Tuesday, April 1, 2025

Defense Time: 1:00 PM

Virtual Meeting Link: <https://asu.zoom.us/j/8756269235>

Location: WXHR A546

Title: The Wave Equation in the Context of Reduced Group C star Algebras

Please share this information with colleagues and other students, especially those studying in similar fields. Faculty and students are encouraged to attend. The defending candidate will give a 40-minute talk, after which the committee members will ask questions. There may be time for questions from those in attendance. But, guests are primarily invited to attend as observers and will be excused when the committee begins its deliberations or if the committee wishes to question the candidate privately.

ABSTRACT
-See next page-

ABSTRACT

This dissertation explores the wave equation in the context of reduced group C^* -algebras $C_r^*(G)$, which may be thought of as a form of extending the classical partial differential equation to non-commutative settings. Motivated by the identification $C(\mathcal{A}) \cong C_r^*(\mathcal{A})$, we formulate the wave equation on $C_r^*(G)$ for countably infinite, possibly non-abelian groups G , using a C_0 -semigroup of operators whose generator serves as an analogue of the Laplacian, we establish the existence and uniqueness of solutions to the wave equation in this setting.

Furthermore, we examine the smoothing effect of the heat kernel within the framework of $C_r^*(G)$. We introduce the smoothing and weak smoothing property of groups, analogous to the heat and weak heat property of groups introduced by Bédos and Conti in their work [Heat Properties for Groups]. We investigate these properties and explore their relationships to other well-known group properties.