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Doctoral  Degree in Mathematics

Thesis Title:

Universality of swap for qudits: a representation theory approach

Have you performed research involving human subjects which requires approval from the Institutional Review Board (IRB)?  Yes  No

IRB Protocol Number \_\_\_\_\_

Have you used live animals, animal tissue, or observational animal work which requires approval from the Institutional Animal Care and Use Committee (IACUC)?  Yes  No

IACUC Protocol Number \_\_\_\_\_

Attach the final copy of thesis/dissertation for committee review. While formatting changes may be requested by the Graduate School, the content of the attached document should be final.



**Approvals:**

Committee Chair Name Emanuel Knill

Signature  Date Signed 3/22/2021

Committee Member Name Richard Green

Signature  Date Signed 3/22/2021

The final copy of this thesis has been examined by the signatories, and we find that both the content and the form meet acceptable presentation standards of scholarly work in the above-mentioned discipline.