GEOMETRY AND TOPOLOGY OF OPTIMAL FLOW NETWORKS

Tatyana Gavrilchenko

A DISSERTATION

in

Physics and Astronomy

Presented to the Faculties of The University of Pennsylvania in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy 2020

A

Eleni Katifori, Assistant Professor of Physics and Astronomy Supervisor of Dissertation

Joshua Klein, Professor of Physics and Astronomy Graduate Group Chairperson

Dissertation Committee

Randall Kamien, Professor of Physics and Astronomy
Alison Sweeney, Associate Professor of Ecology and Evolutionary Biology
Danielle Bassett, Professor of Bioengineering
Cullen Blake, Assistant Professor of Physics and Astronomy
Eleni Katifori, Assistant Professor of Physics and Astronomy