

# TEMPLE UNIVERSITY

Department of Mathematics

## Analysis Seminar

Room 617 Wachman Hall

Monday, December 5, 2022, 2:30 p.m.

### *Global dynamics and blowup in some quadratic PDEs*

by Jonathan Jaquette

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**Abstract:** Conservation laws and Lyapunov functions are powerful tools for proving the global existence and stability of solutions, but for many complex systems these tools are insufficient to completely understand non-perturbative dynamics. In this talk I will discuss a complex-scalar PDE which may be seen as a toy model for vortex stretching in fluid flow, and cannot be neatly categorized as conservative nor dissipative.

In a recent series of papers we have shown that this equation exhibits rich dynamical behavior that exist globally in time: non-trivial equilibria, homoclinic orbits, heteroclinic orbits, and integrable subsystems foliated by periodic orbits. On the other side of the coin, we show several mechanisms by which solutions can blowup. I will discuss these results, and current work toward understanding unstable blowup.