Mathematics Colloquium

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- **Topic:** ***Numerical modeling of self-focusing in nonlinear optics***

- **Date & Time:** Thursday, April 24 @ 3:30 PM

- **Place:** Room 207 Sid Richardson Building

- **Refreshments:** 3:00 PM in Room 318 Sid Richardson

- **Abstract:** We present a novel technique to numerically solve beam propagation problems based on the paraxial and nonparaxial scalar nonlinear Schrödinger (NLS) equation in two transverse dimensions with cylindrical symmetry. Using fast algorithms for Hankel transforms along with adaptive longitudinal stepping and transverse grid management in a symmetrized split-step technique, it is possible to accurately track a beam much closer to its physical collapse due to self-focusing for the paraxial NLS than other existing methods, notably the fast Fourier transform-based standard split-step technique. For the nonparaxial NLS, the adaptive fast Hankel transform-based split-step method with an adaptive nonparaxiality parameter yields results comparable to the more rigorous vector nonlinear wave equation.