Math 652: Projects

1. Modeling Tumor Angiogenesis:

2. Solitary Wave Collisions in Continuum and Discrete models:

3. Population Dynamics in Heterogeneous Environments

4. Continuum and/or Discrete Models of Neurons

5. Discrete Nonlinear Optics

6. Simple Cosmological Models

7. Vortex Dynamics

8. Catalytic Reactions and Chemical Turbulence

9. Bose-Einstein Condensation
   Starting Point: Reviews of Modern Physics 71, 463-512 (1999) [see particularly about the Gross-Pitaevskii equation]. Possible Topics: Study of the ground state and stability of the GP, the optical lattice potential, possibly 2D dynamics and vortices.

10. Calcium Waves in Cardiac Cells

11. Focusing/Blowup and Wave Collapse

12. Discrete sine-Gordon equation and sine-Gordon PDE

13. Nonlinear Fiber Optics
    Starting Point: Review of Modern Physics 61, 763-915 [see particularly about the nonlinear Schrödinger equation]. Possible Topics: Study of the cubic NLS with a (quintic and/or impurity) perturbation.

14. Chemical Kinetics
    Starting Point: SIAM Review 42, 161-230 (2000) [see particularly about the KPP equation]. Possible Topics: Fronts, their dynamics, stability and potential dragging.

15. Your own choice (in coordination with PK).