

# BI-CO MATHEMATICS COLLOQUIUM

Benjamin Seibold  
Temple University

## *“The Analogy of Phantom Traffic Jams and Detonation Waves”*

**Monday, October 8, 2012**

Talk at 4:00 – E309

Tea at 3:00 – KINSC Math Lounge, H208

### **Abstract:**

Initially homogeneous vehicular traffic flow can become inhomogeneous even in the absence of obstacles. We show that such “phantom traffic jams” can be explained as instabilities in certain macroscopic traffic models. Moreover, in this unstable regime, small perturbations amplify and grow into nonlinear traveling waves. These traffic waves, called “jamitons”, are observed in reality and have been reproduced experimentally. Our research shows that jamitons are analogs of detonation waves in reacting gas dynamics. This analogy enables us to analytically predict the shape and travel velocity of the jamitons. We then demonstrate that there is a deep connection between the existence of jamitons, the instability of uniform base states, and a specific “sub-characteristic” condition of the traffic model.

**HAVERFORD COLLEGE**