

**JOINT EVENT**

**PHYSICAL MATHEMATICS SEMINAR**  
**AND**  
**NUMERICAL METHODS FOR PARTIAL**  
**DIFFERENTIAL EQUATIONS SEMINAR**

**If space turned out to be time:  
Resonances in the visual cortex**

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**ABSTRACT:**

When subjects are exposed to full field flicker in certain frequencies, they perceive a variety of complex geometric patterns that are often called flicker hallucinations. On the other hand, when looking at high contrast geometric patterns like op art, shimmering and flickering is observed. In some people, flicker or such op art can induce seizures. In this talk, I describe a simple network model of excitatory and inhibitory neurons that comprise the visual area of the brain. I show that these phenomena are reproduced and then give an explanation based on symmetry breaking bifurcations and Floquet theory. Symmetric bifurcation theory also shows why one expects a different class of patterns at high frequencies than those at low frequencies. Next, I will describe the flip side of this coin and discuss a theory of uncomfortable images. Many people exhibit visual discomfort when looking at high contrast geometric patterns such as seen in op art. I'll discuss some recent results where we show that such patterns can induce global oscillations in a network similar to the one used in the flicker study.

**TUESDAY, APRIL 30, 2019**  
**2:30 PM – 3:30 PM**  
**Building 2, Room 139**

*Reception following in Building 2, Room 290  
(Math Dept. Common Room)*

<http://math.mit.edu/seminars/pms/>