# PHYSICAL MATHEMATICS SEMINAR

# The structure and dynamics of adaptive vascular networks


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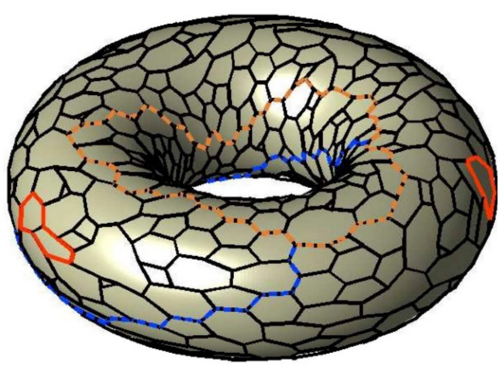
**ABSTRACT:**

Biological transport webs, such as the blood circulatory system in the brain and other animal organs, or the slime mold *physarum polycephalum*, are typically hierarchical and complex, featuring many orders of vessel diameters. The architecture of these networks, as defined by the topology and edge weights, determines how efficiently the networks perform their function. In this talk we present some general models regarding the emergence and extraction of hierarchies in biological transport networks, with emphasis on animal vasculature. In particular, we first discuss how a hierarchically organized vascular system can develop and adapt under constant or variable flow. We show how time-dependent flow can stabilize anastomoses and lead to a topology dominated by cycles. In the second half of the talk, we discuss some tools to characterize the topology of cycle-rich network architectures, such as the one found in the mammalian neocortex.

**TUESDAY, MARCH 21, 2017**
**2:30 PM**
**Building 2, Room 147**

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

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

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