

PHYSICAL MATHEMATICS SEMINAR

Phyllotaxis, pushed pattern fronts and optimal packing

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ABSTRACT:

For more than two thousand years, natural scientists and philosophers have been fascinated, intrigued and confounded by the wonderful architecture seen at the shoot apical meristems (SAMs) of plants and the connections with Fibonacci sequences. Only recently have widely accepted rational explanations for what is observed been suggested. One approach, the teleological approach, based largely on the observations and rules of Hofmeister and developed further by ingenious experiments and by cellular automata-like algorithms pioneered by Douady and Couder, posits that plants find a way to lay incipient phylla (flowers, bracts, spines) using ‘most open space’ criteria. The second and mechanistic approach attempts to explain observations by modeling the biochemical and biomechanical processes at work at the SAM and, in particular, the role of the plant hormone auxin. Such models lead to pattern forming pdes and I will show that the patterns of auxin maxima laid down by pushed fronts which invade the unstable constant auxin concentration region capture much of what is observed.

TUESDAY, OCTOBER 13, 2015

2:30 PM

Building E18, Room 466A

*Reception following in Building E17, Room 401A
(Math Dept. Common Room)*

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