

# Analysis/Dynamical Systems Seminar

Thursday, May 5, 2016

4:00-4:50 pm in Hume 321

## Moving boundaries and dynamical systems: from lasers to dynamical Casimir effect

Nikola Petrov

University of Oklahoma

We consider the electromagnetic field in a one-dimensional spatial domain one of whose boundaries is stationary, while the other one is moving (quasi)periodically. We show how the boundary value problems for the field can be expressed in terms of the iterates of a map of the circle (or a map of the torus in the quasiperiodic case). After a brief review of some facts from theory of circle maps, we show how one can draw conclusions about the asymptotic behavior of the electromagnetic field from these facts. Finally, we discuss some aspects of the problem of a quantum field in a domain with moving boundaries. In 1948, Hendrik Casimir predicted that two parallel plates (without electric charges and neglecting the gravitational attraction between them) will attract each other because of quantum fluctuations of the vacuum - an effect that has since been observed experimentally. The dynamical Casimir effect is the Casimir effect between two plates one of which is moving with acceleration. We show the connection between the dynamical Casimir effect and the theory of circle maps. The talk will not require background in either dynamical systems or physics.