

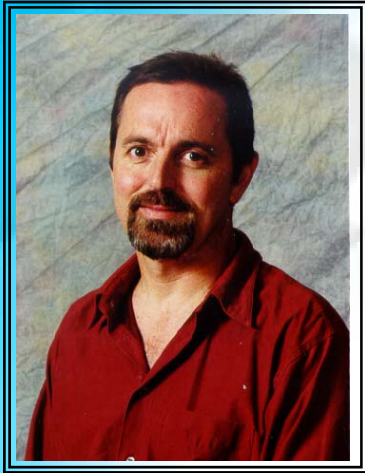
Physics Colloquium

Michigan Technological University

Thursday, September 18, 2008

4:00 - 5:00 pm

Room 139, Fisher Hall



An Irreversibility Paradox in Simple Chaotic Systems

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ABSTRACT

The term irreversibility usually evokes the inability of thermodynamics to be reversed. However, it may also refer to the inability of even quite simple dynamical systems to retrace their evolution if they are not perfectly controlled. Indeed, there has been a great deal of recent interest in a quantity known as the fidelity, which can measure precisely this brand of irreversibility. It turns out that simple, classically chaotic systems are effectively irreversible whereas their quantum counterparts are quite reversible. It is therefore paradoxical that it has been shown, via semi classical theory, that classical dynamics can be used to construct excellent approximations of quantum dynamics for long time scales under these circumstances; i.e. ~ how can it make sense that an irreversible dynamics reconstructs accurately a reversible dynamics. We discuss the resolution of this paradox and its relation to the structural stability inherent in classically chaotic systems in spite of their individual trajectories' exponential sensitivity to initial conditions.

BIOGRAPHY

Prof. Tomsovic is a professor and chair of the department of physics at Washington State University. He received his B.S. in physics from Michigan Tech and PhD from the University of Rochester. His research area is Quantum Chaos which is an interdisciplinary branch of physics which arose in the second half of the 20th century from the modeling of quantum/wave phenomenon with classical models which exhibited chaos.

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