This common and unfortunate fact of the lack of adequate presentation of basic ideas and motivations of almost any mathematical theory is probably due to the binary nature of mathematical perception. Either you have no inkling of an idea, or, once you have understood it, the very idea appears so embarrassingly obvious that you feel reluctant to say it aloud.

—Mikhael Leonidovich Gromov

THE TRIVIAL NOTIONS SEMINAR

A classical uncertainty principle

a talk by

Keeley Hoek

ABSTRACT

Gromov's non-squeezing theorem is a cornerstone of symplectic topology. Liouville's theorem says that time evolution of a Hamiltonian system preserves volume in phase space, and we can view the non-squeezing theorem as saying something more: endowing $\mathbb{R}^{2n} = \{(q_1, p_1, q_2, p_2, \ldots)\}$ with the standard symplectic structure, symplectically mapping the standard ball $B^{2n}(r)$ into the standard cylinder $B^2(R) \times \mathbb{R}^{2n-2}$ is prohibited when $r > R$. For the conjugate variables (q_i, p_i), this has the flavor of a classical analogue of Heisenberg's uncertainty principle. I will try to explain the theorem and a precise sense in which there is an analogy.

Friday, April 28, 2023

11:50am

Science Center, Room 232