

Northeastern University



Mathematics Department

Geometry, Physics, and Representation Theory Seminar

**Si Li**

Tsinghua University

Thursday, November 21, 2:50-3:50 pm, Lake Hall 509

**Localized Effective Theory, Semi-classical  
Approximation and Algebraic Index**

**Abstract**

We describe a general framework to study the quantum geometry of  $\sigma$ -models when they are effectively localized to small quantum fluctuations around constant maps. Such effective theories have exact descriptions at all loops in terms of target geometry and can be rigorously formulated. We illustrate this idea by the example of topological quantum mechanics which will lead to an explicit construction of the universal trace map on periodic cyclic chains of matrix Weyl algebras. As an application, we explain how to implement the idea of exact semi-classical approximation into a proof of the algebraic index theorem using Getzlers Gauss-Manin connection. This is joint work with Zhengping Gui and Kai Xu.