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**Scrambling in a three-mode BEC and Anderson localization
in a Rydberg gas**

Abstract: My talk contains two parts. In part 1 I report on a proposal for measuring out-of-time-ordered correlators (OTOCs) in a spinor BEC. We study the classically chaotic dynamics in the mean field, or large N , limit and analyze how features of classical chaos manifest in the quantum dynamics at finite N . In Part II results on observing Anderson localization in a 2D gas of Rydberg excited atoms are presented. We model this system as a quantum walk with random hopping rates. The disorder strength can be tuned via the Rydberg atom density resulting in apparent ergodicity at small disorder.