1092-35-381 **Mickaël D. Chekroun*** (mchekroun@atmos.ucla.edu), Department of Atmospheric & Oceanic Sciences, University of California, Los Angeles, CA 90095, **Michael Ghil**, Department of Atmospheric & Oceanic Sciences, University of California, Los Angeles, CA 90095, **Honghu Liu**, Department of Atmospheric & Oceanic Sciences, University of California, Los Angeles, CA 90095, and **Shouhong Wang**, Department of Mathematics, Indiana University, Bloomington, IN 47405.
Pullback characterization of stochastic approximating manifolds: Non-Markovian stochastic reduced equations, and applications.

In this talk, we will first present how the approximating manifolds presented in Honghu Liu's talk can be described by a pullback characterization of the non-critical modes from the critical modes.

A general stochastic reduction procedure — based on this pullback characterization — will be then presented. It yields in particular to reduced systems of non-Markovian stochastic differential equations (SDEs) derived rigorously from the original SPDE.

These non-Markovian SDEs involve random coefficients that convey memory effects via the history of the noise, and arise from the nonlinear, leading-order interactions between the critical and non-critical modes, embedded in the "noise bath."

The approach will be then illustrated on a stochastic Burgers-type equation. It will be shown that the contribution of the memory effects become determinant as some spectral gaps decrease while the amount of the noise increases. In particular, it will be emphasized how such memory effects may turn out to play a significant role in the capture of the statistics of extreme events.

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