COLOQUIO JUNIOR

Martes 25 de noviembre, 17:00h (coffee break a las 18:00)

Aula Naranja, ICMAT

Laura González Bravo

Universidad Carlos III de Madrid

The category of non-commutative probabilities in Information Geometry

The foundational theorems of Čencov and Petz provide a characterization of invariant geometries for finite-dimensional classical and quantum systems, respectively. However, extending these insights into a unified framework that seamlessly incorporates infinite-dimensional and continuous systems remains a significant challenge. This work introduces the category of non-commutative probabilities, NCP, as a new foundation for information geometry. Built upon the language of operator algebras, NCP provides a common environment for both classical and quantum theories, applicable in both finite and infinite dimensions. Within this setting, we reformulate the problem of characterizing invariant geometries. Instead of classifying metric tensors on manifolds of states, we propose the classification of "fields of covariances," defined as functors from NCP to the category of Hilbert spaces. This approach recasts the crucial monotonicity property as a natural condition of functoriality. Furthermore, we demonstrate how this framework accommodates the description of statistical models as dedicated subcategories.

ICMAT INSTITUTO DE CIENCIAS MATEMÁTICAS

UAM Universidad Autónoma de Madrid

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