

Probabilistic operator Algebra Seminar

Organizer: Dan Virgil Voiculescu

Monday, 9:00 am–10:30 pm, to attend via Zoom email David Jekel (daj@math.ku.dk) rem

Jun 1 **David Jekel**, Copenhagen University

Free information geometry and the model theory of noncommutative stochastic processes

We study optimal transport theory in the free probabilistic setting motivated by the large- n theory of random tuples of matrices. We define a new version of free entropy χ_{chron}^{cU} , which is concave along geodesics in the corresponding Wasserstein space. Moreover the heat evolution satisfies the evolution variational inequality, which means that the heat evolution is the Wasserstein gradient flow for entropy in the metric sense. It also has further desirable properties such as chain rule for iterated conditioning, and an expression in terms of stochastic control problems. This entropy is defined using microstate spaces of matrix approximations with respect to an expanded class of test functions called *chronological formulas*, which are constructed so as to be closed under taking partial suprema and infima and application of a free heat semigroup. These formulas are part of a novel framework for studying noncommutative filtrations and stochastic processes as metric structures in the sense of continuous model theory.