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*Non-Commutative Stochastic Processes and Bi-Free Probability*

When Voiculescu introduced the notion of bi-free independence, he envisioned that the theory would model the transition between past and future states. As such, the objects under consideration were called “pairs of faces” after the Roman god of transitions Janus who is often depicted with two faces, one looking to the past and one to the future. In this talk, we will discuss how the transition operators for non-commutative stochastic processes can be modelled using technology from bi-free probability. Several important examples are recovered with this approach and new formula are obtained for processes with free increments. The benefits of this approach are also discussed.