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Ian Charlesworth, Zhiheng Li, Kyle P Meyer, Drew T Nguyen and Jennifer Pi*,
jspi@uci.edu, and **Annie K Raichev**. *Characterizations of Infinitesimal Non-Crossing Bi-Free Probability*. Preliminary report.

Free probability is a non-commutative analogue of probability introduced in the 1980s by Voiculescu, where the notion of independence is replaced by the condition of free independence. Biane, Goodman, and Nica adapted the combinatorics to give a Type B free probability, arising from the Type B non-crossing partitions; Belinschi and Shlyakhtenko showed this notion to be equivalent to an infinitesimal free independence for a time-indexed family of states satisfying the freeness conditions to first order. More recently, Voiculescu has introduced bi-free probability, an extension of free probability to handle simultaneously left and right actions on free product spaces. After covering the necessary background, this talk will demonstrate how these extensions can be combined to give an infinitesimal bi-free probability. In particular, it will be shown that the bi-free generalizations of the combinatorial and analytic characterizations of infinitesimal free independence are equivalent. (Received September 13, 2019)