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Axel Saenz* (asaenzrodriguez@tulane.edu), **Zhipeng Liu** (zhipeng@ku.edu) and **Dong Wang** (matwd@nus.edu.sg). *Integral Formulas for the Asymmetric Simple Exclusion Process on the Ring.*

The [totally] asymmetric simple exclusion process ([T]ASEP) is a Markov process that is the prototypical model for transport phenomena in non-equilibrium statistical mechanics. It was first introduced by Spitzer in 1970, and in the last 20 years, it has gained a strong resurgence in the emerging field of "Integrable Probability" due to exact formulas from Johanson in 2000 and Tracy and Widom in 2007 (among other related formulas and results). In particular, these formulas led to great insights regarding fluctuations related to the Tracy-Widom distribution and scaling to the Kardar-Parisi-Zhang (KPZ) stochastic differential equation.

In this work, we present new exact formulas for the ASEP on the ring generalizing the formulas of the ASEP on the line by Tracy and Widom in 2007 and the formulas for the TASEP on the ring by Baik and Liu in 2016. In the case of TASEP on the ring, Baik and Liu have already shown new and interesting phenomena on the ring that has been technically difficult to show on the line such as multi-time correlations. We hope that these formulas for the ASEP on the ring will also lead to further insights into the KPZ universality class. In this talk, we will discuss the methods used and obstacles encountered in the proof of these formulas. (Received August 19, 2019)