Dunkl jump processes: relaxation and a phase transition

Sergio Andraus and Makoto Katori

Department of Physics, Faculty of Science and Engineering, Chuo University

Random matrices and their applications
Kyoto University, 2018-05-22

Dunkl jump processes

Dunkl processes are generalizations of multidimensional Brownian motion obtained through the use of differential-difference operators (Dunkl operators) to construct the infinitesimal generator (Dunkl Laplacian). They are associated to root systems, and have discontinuities.

- Continuous part: *radial* Dunkl processes.
  - A_{N-1}: Dyson model ($\beta > 0$)
  - B_N: Wishart-Laguerre processes / interacting Bessel processes ($\beta > 0$, $\nu > -1/2$)
- Discontinuous part: Dunkl Jump processes

Example: process of type A_{N-1}

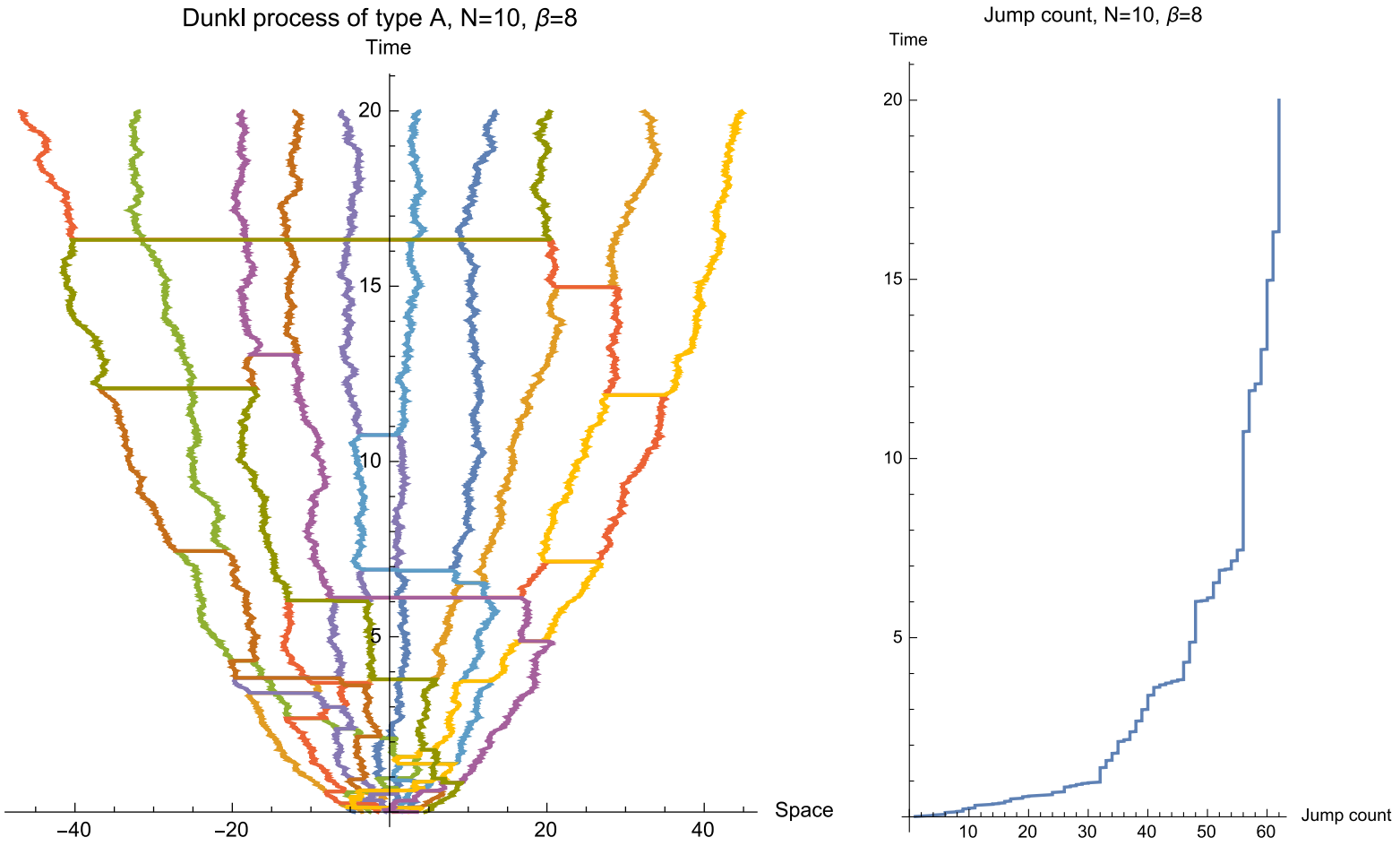

Figure: Sample of the Dunkl process of type A_{N-1} and its jump count for $N = 10$, $\beta = 8$. The horizontal lines represent jumps.

Problems we study

- Dunkl jump process
  - Dynamics $\rightarrow$ master equation
  - Relaxation $\rightarrow$ behavior at long times and convergence to equilibrium
- Jump counting process
  - Long-time behavior and jump rate
  - Phase transition in the bulk scaling limit ($t \sim N$) for the processes of type A_{N-1} and B_N at $\beta_c = 1$

For details, please come see the poster!