# Fast Sinkhorn: Groups and Fast Algorithms on Optimal Transport

**Speaker:** Qichen Liao (Tsinghua University)

**Time:** 2023-03-02, 16:10 to 17:00

**Location:** Rm 1801, Guanghua East Tower

**Advisor:** Hao Wu

**Abstract:** Introduced by the Optimal Transport theory, Wasserstein distance defined on the measure space has found applications for many fields such as machine learning, signal processing, seismic inversion, etc. As a linear programming problem, the algorithmic complexity of computation prevents their direct use on large scale datasets. Using the entropy regularization, the original problem is reduced to a matrix scaling one, which can be solved by the Sinkhorn iteration with $O(N^2)$ complexity. However, for a large dataset, big $N$ still leads to a computational bottleneck. By exploring the structure of matrix in the computation of Wasserstein-1 metric on mesh, we reduce the complexity of matrix-vector multiplication to $O(N)$ in the process of algorithm, and developed a new algorithm call Fast Sinkhorn, which achieves fast and stable computation of Wasserstein-1 metric.