A Note on the Paper “Poincaré Inequality on the Path Space of Poisson Point Processes”

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In the recent paper [2] we proved a Poincaré inequality on the path space of compound Poisson processes by using transition probabilities and the Markov property. Our purpose is to develop a general argument for stochastic analysis on the path space of jump processes as indicated in the introduction.

After the paper was published, we learnt from some colleagues that the Poincaré inequality we obtained was already known by L. Wu [3, Remark 1.4] using martingale representations of Poisson point processes. Moreover, the invalidity of the log-Sobolev inequality was already known by D. Surgailis [1]. The Dirichlet form considered in these two papers is the birth-death Dirichlet form on the $L^2$ space of a Poisson measure, which covers our framework by taking the Poisson measure with intensity $\nu(dx) \times dt$ on $\mathbb{R}^d \times [0, T]$, where $\nu$ is the Lévy measure of the underlying compound Poisson process. Unfortunately, we did not aware this point when we prepared our paper, so that the important references [3, 1] were not cited.

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References

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[2] F.-Y. Wang, C. Yuan, Poincaré inequality on the path space of Poisson point processes, 23(2010), 824–833.

[3] L. Wu, A new modified logarithmic Sobolev inequality for Poisson point processes and several applications, Probab. Theory Relat. Fields 118 (2000), 427-438.