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Joint density for the local times of continuous-time random walks

We investigate the local times of continuous-time random walks on arbitrary discrete state spaces. For fixed finite range of the random walk, we derive an explicit formula for the joint density of all local times on the range, at any fixed time. We apply this formula in the following directions:

- (1) we prove the analog of the well-known Ray–Knight description of Brownian local times for continuous-time simple random walk on \mathbb{Z} ,
- (2) we derive large deviation estimates for exponential integrals of the normalized local times beyond the exponential scale.

This work was done in collaboration with Remco van der Hofstad and Wolfgang Koenig.