

# EXPONENTIAL FUNCTIONALS OF MARKOV ADDITIVE PROCESSES

ANITA BEHME (JOINT WORK WITH APOSTOLOS SIDERIS)

We provide necessary and sufficient conditions for convergence as  $t \rightarrow \infty$  of exponential functionals of Markov additive processes of the form

$$\mathfrak{E}_{(\xi,\eta)}(t) := \int_{(0,t]} e^{-\xi_s} d\eta_s, \quad 0 < t < \infty,$$

where  $(\xi_t, \eta_t, J_t)_{t \geq 0}$  is a Markov additive process with Markovian component  $(J_t)_{t \geq 0}$ . Other than in the classical Lévy case (i.e.  $(\xi_t, \eta_t)_{t \geq 0}$  is a bivariate Lévy process) studied by Erickson and Maller [2] where exponential functionals turn out to either converge almost surely or diverge, in case of Markov additive processes it is necessary to distinguish between weak and almost sure convergence.

Our proofs rely on recent results on perpetuities in a Markovian framework by Alsmeyer and Buckmann [1].

## REFERENCES

- [1] Alsmeyer, G. and Buckmann, F. (2017) Stability of perpetuities in Markovian environment, *J. Difference Equ. Appl.* **23**, pp. 699-740, 2017.
- [2] Erickson, K. B. and Maller, R. A. (2005) Generalised Ornstein-Uhlenbeck processes and the convergence of Lévy integrals, in Emery, M. and Ledoux, M. and Yor, M. (eds.) *Séminaire de Probabilités XXXVIII, Lecture Notes in Mathematics 1857*, pp 70-94, Springer, Berlin.