

# ESTIMATION OF STOPPING TIMES FOR SOME STOPPED RANDOM PROCESSES

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*Bessel process; Levy process; Mellin transform; Laplace transform:*

Let  $X = (X_t)_{t \geq 0}$  be a known process and  $T$  an unknown random time independent of  $X$ . Our goal is to derive the distribution of  $T$  based on an i.i.d sample of  $X_T$ . This problem was solved by Belomestny and Schoenmakers in [1] and [2] using the Mellin and Laplace transforms in cases where  $X$  is a Brownian motion or a Levy process. Applying their technique we construct nonparametric estimators for the density of  $T$  in cases where  $X$  is a Bessel process or a Levy process in a hypergroup setting. We calculate the convergence rates of our estimators, which turn out to be optimal in the minimax sense.

## References

- [1] Belomestny, D., Schoenmakers, J. (2016) *Statistical inference for time-changed Levy processes via Mellin transform approach*, Stochastic Processes and their Applications 126, 2092–1222.
- [2] Belomestny, D., Schoenmakers, J. (2015) *Statistical Skorohod embedding problem: Optimality and asymptotic normality*, Statistics & Probability Letters 104, 169–180.