

## On Lebesgue decomposition of $p$ -adic distributions

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*With an appendix by Victor Alexandru*

**Abstract.** Given a prime number  $p$ , let  $\mathbb{C}_p$  be the Tate field, which is the topological completion of the algebraic closure of the field of  $p$ -adic numbers with respect to the usual  $p$ -adic absolute value. Let  $X$  be a compact subset of  $\mathbb{C}_p$ , which is without isolated points. The goal of our paper is to give a  $p$ -adic analogue of the classical theorem of Lebesgue–Radon–Nikodym, that is, under some hypothesis, a  $p$ -adic distribution on  $X$  with values in  $\mathbb{C}_p$ , in the sense of Mazur, decomposes into a sum of two distributions, one of them given by the Radon–Nikodym derivative and the other a  $p$ -adic measure.

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