

**Workshop in Stochastic Analysis and
Applications**

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**A strong invariance principle for the
elephant random walk**

Abstract

We consider a discrete-time random walk on \mathbb{Z} with unbounded memory called the elephant random walk (ERW). That is an interesting random walk since, depending on the value of its parameter $p \in (0, 1)$, it presents both normal and anomalous diffusion. We prove a strong invariance principle for the ERW. More specifically, we prove that, under a suitable scaling and in the diffusive regime as well as at the critical value $p_c = 3/4$ where the model is marginally superdiffusive, the ERW is almost surely well approximated by a Brownian motion. As a by-product of our result we get the law of iterated logarithm and the central limit theorem for the ERW. Joint work with Cristian Colleti (UFABC) and Gunter Schutz (Institute of Complex Systems).