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Title: Large Fluctuations in anomalous transport and the Big Jump Principle

Abstract: The big jump principle is a peculiar mechanism that triggers large fluctuations in stochastic processes with heavy-tailed distributions. The principle explains extreme events in a wide class of natural and man-made systems not in terms of an accumulation of many small subevents but solely as an effect of the biggest event, the big jump.

The big jump principle is a well established mathematical result for sums of independent and identically distributed random variables with sub-exponential distribution. However its extension and application to more physical processes is still far from being understood. By means of an effective approach, we show that the principle applies to a wide class of problems casted in terms anomalous transport, such as generalized Lévy walks and the Lévy Lorentz gas, also in the presence of stretched exponentials. We use the principle to derive the exact form of the tail of the probability distribution, providing a physical explanation of the processes driving the rare events.