Deformed random walk: suppression and inhomogeneous diffusion

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We study a generalization of the random walk (RW) based on a deformed translation of the unitary step, inherited by the q-algebra, a mathematical structure underlying nonextensive Tsallis statistics. The RW with deformed step implies an associated deformed random walk (DRW) provided with a deformed Pascal triangle along with an inhomogeneous diffusion. The paths of the RW in deformed space are divergent, while the corresponding to the DRW converge to a fixed point. Standard random walk is recovered for $q\rightarrow1$ and a suppression of randomness is manifested for the DRW with $-1 < \gamma_q< 1$ and $\gamma_q = 1 - q$. The passage to the continuum of the master equation associated to the DRW led to a van Kampen inhomogeneous diffusion equation when the mobility and the temperature are proportional to $1+\gamma_1 x$, and provided with an exponential hyper-diffusion that exhibits a localization of the particle at $x=-1/\gamma_q$ consistent with the fixed point of the DRW.