

A Closer Look at the Fine Structure of the Random Walk on $(0, 1)$

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Let S_n be the random walk on $(0, 1)$. The S_n have been the subject of intense study; their definition is immediately intuitive. Nevertheless, they are quite disorderly and this disorder is mirrored by the fact that, pointwise, $\left(\frac{S_n}{\sqrt{n}} \mid n \in \mathbb{N}^+\right)$ behaves quite badly. In this talk we provide our results on the fine structure of the random walk that give insight into the disorderly behavior of the S_n . We will define the notion of extreme sequences in this context, and provide a complete analysis of the levels at which certain sequences first become extreme. It turns out that much of the fine structure of the random walk on $(0, 1)$ depends on how often the sequence $\{[k\sqrt{n}]\}_{n=1}^{\infty}$ increases and the way the fractional part of $k\sqrt{n}$ is distributed, for a fixed positive integer k . This work lays the groundwork for further developments where k is a function of n .

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