Contribution ID: **196** Type: **poster**

Bayes' theorem and fluctuation theorems

Using Bayes' theorem we present a simple and general model which allows us to generate distributions of change in entropy between two macroscopic states. Obtained results are with agreement with the Second Law of thermodynamics, favouring decrease in the number of macroscopic states (keeping the number of microscopic states constant) and thus increasing the number of microscopic realisations of the surviving macrostates.
Due to the close resemblance of our expression to the fluctuation theorems we discuss its relation to Crooks Fluctuation Theorem. Surprisingly, the distributions obtained during experimental verification of Crooks relation on RNA strands follow closely the distributions obtained from our Bayesian relation.

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