1036-35-24 **Avner Peleg*** (apeleg@nsm.buffalo.edu), Department of Mathematics, University at Buffalo, SUNY, Buffalo, NY 14260. *Raman-induced energy exchange between optical solitons as a random cascade model.*

We study the effects of delayed Raman response on a probe soliton propagating in an optical fiber under collisions with a random sequence of pump solitons. In a recent paper we showed that the probe soliton exhibits intermittency in the sense that the normalized moments of its parameters grow exponentially with propagation distance z [1]. This is a surprising result since optical fiber systems are weakly nonlinear, whereas intermittency is associated with strongly nonlinear phenomena such as turbulence and chaotic flow. Here we show that this similarity is not coincidental, but rather a consequence of similarity between the dynamic equation for the probe soliton's amplitude and the equation for energy dissipation in random cascade models in turbulence. We characterize the statistics of the probe soliton's amplitude by the τ_q exponents, which are used for analyzing multifractals, and relate these exponents to the entropy function $S(x)$. We find that the BER and the Raman-induced self frequency shift exhibit power-law behavior as functions of z, where the exponents can be expressed in terms of τ_q or $S(x)$. Similar behavior is expected in systems where the energy exchange is due to cubic nonlinear loss/gain. [1] A. Peleg, Phys. Lett. A 360, 533 (2007). (Received November 23, 2007)