Solar Energetic Particle Events (SEPEs) are one of the most important radiation environments that need to be considered for the design and operation of space missions, both unmanned and manned. They are one of the key elements of Space Weather and on Earth, can affect radio transmission (e.g. Polar Cap Absorption events) and the chemistry of the upper atmosphere and ozone layer. In the future as longer duration manned missions to the moon and Mars are planned, the risk from the largest of these events will increase. The need or desirability of reliable forecasting systems requires a greater understanding of the how these events occur in time.

Up till recently, it has been assumed that these events are random in time, being well described by the Poisson distribution. In this work other distributions have been investigated and would appear to fit the data better, with a Levy one giving the best fit. The results also show memory and clustering effects. The latter has also been found in the fast CMEs, which produce the shocks, that give rise to the events.

Using the ESA sponsored Solar Energetic Particle Event Modelling (SEPEM) tools, a comparison of the goodness of fit of 3 different distributions, Levy, time-dependent Poisson and Poisson to SEPEs which occurred during the last 4 solar cycles was made and will be presented along with a discussion of memory and clustering effects.