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The q-index from generalized statistical mechanics as a measure of the strength of perturbations in a Maier-Saupe potential NATHAN DAWSON, Case Western Reserve Univ — The argument for Tsallis statistics as an accurate interpretation of physical systems has been debated for over two decades. The application of Tsallis statistics to nematic liquid crystals has been shown to give an accurate and improved theoretical description of the orientational order parameter in some nematics. Speculations concerning the reasons behind these improved predictions have focused on arguments for long-range microscopic order, memory effects in fractal time, and fractal spatial ordering. In this presentation, an alternative explanation is investigated where q-thermostatistics simply adjusts the emphasis on the frequency of events of power-law probability distributions for an unperturbed Maier-Saupe potential. This dilation of Boltzmann-Gibbs statistics applied to liquid crystal systems affects the predicted mean field value of systems such that an unperturbed system can mimic a perturbed one. This newly introduced view is tested by showing accurate predictions for the orientational order parameter of two discogens in the $\mathrm{col}_{\mathrm{ho}}$ phase with persistent translational interactions. In conclusion, the q-index may just be a simple mathematical tool to measure the degree to which a potential is of Maier-Saupe type.

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