errors of extrapolation make the determination of α done here somewhat unreliable. The best way to reduce errors is to have larger simulations and to improve the understanding of the limit $k \to \infty$. What we see is that $k \simeq 14$ is still too low. We did not know this ahead of the simulation and unfortunately larger values of k were not recorded. This decision was made ahead of the simulations: we only stored moments of distributions rather than full configurations. Full configurations generate very large data files in order to get large enough statistics. Due to various limitations, we opted for this approach. In a sense, we have performed this analysis as a blind analysis on the data. Consider however, that the information we have gathered is important from another perspective. If one sets out to do large simulations, the problems of data management is an issue. Our exploration gives us some rather precise information of how much data we need to keep and in what type of format.

As a further thought, one expects that there are corrections to the scaling behavior that would involve some power series of q. Such corrections would require much more data to do a proper fit, as well as a systematic understanding of the functional form of the correction. If this is studied, the dominant scaling exponent (that with the smallest power of α) would be revealed for q small.

It would certainly be interesting to study these puzzles further and to match some properties to the gravity theory in observables that can be matched on both sides with better understanding (for example the energies of string states, as was done for the ground state in [18]).

IV. CONCLUSION

In this paper we have examined the problem of extracting geometric data from a system that exhibits emergent geometry in a thermodynamic limit where the number of particles N in a statistical mechanical system becomes large. The geometric data we computed was one single parameter: the radius of a feature, that depends functionally on a variable defining a one parameter family of wave functions of the system.

In order to measure this geometric feature, we needed some scheme to define the shape parameter at finite N. We chose observables that were simple to calculate numerically and that have a reasonable behavior at large N as given by our theoretical expectations