Numerical calculation of granular entropy: counting the uncountable.

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In 1989, Sir Sam Edwards introduced the concept of ‘granular entropy’, defined as the logarithm of the number of distinct packings of N granular particles in a fixed volume V. The proposal was rather controversial but much of the debate was sterile because the granular entropy could not even be computed for systems as small as 20 particles - hardly a good approximation of the thermodynamic limit. In my talk I will describe how granular entropies of much larger systems can now be computed, using a novel algorithm. Interestingly, it turns out the definition of granular entropy will have to be modified to guarantee that granular entropy is extensive.