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Thinking Outside the Sandbox

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Theoretical approaches for inherently out-of-equilibrium systems, from granular to live matter, are at the forefront of soft condensed matter physics. Edwards pioneered a statistical mechanics framework to describe jammed particulate materials, which explains the slow compaction of granular materials towards a given density, the reversibility of such experiments, and the equilibration between shaken powders of different types. During my PhD, Edwards's theoretical work inspired me to develop a transparent emulsion system to test the microscopic distributions underlying granular thermodynamics. I will talk about what it was like to have Sir Sam as a PhD adviser and how he uniquely inspired my curiosity to design and build novel materials, which are not random, but assemble via mobile, multicolored bonds that respond to environmental cues. I will give an overview of this kind of experimentally guided assembly these results call for new theories of emulsions with programmable architectures.