



THE DEPARTMENT OF MATHEMATICAL SCIENCES PROUDLY PRESENTS

# COLLOQUIUM

Fall 2023

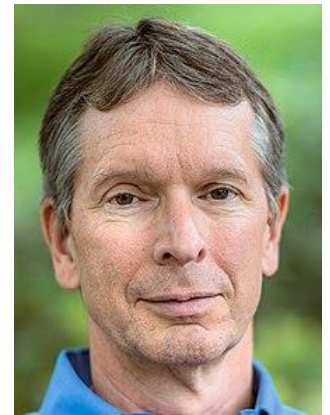
## Dynamics Beyond Spacetime

Dr. Donald Hoffman

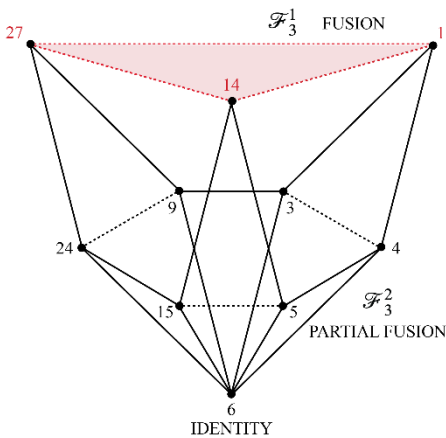
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10:30 am



Abstract



Many high-energy theoretical physicists say that “spacetime is doomed,” that spacetime is not fundamental because it has no operational meaning beyond the Planck scale. In the last decade they have found structures beyond spacetime, such as decorated permutations, which predict the amplitudes for scattering processes of particles in spacetime. We show that decorated permutations code the recurrent classes of Markov chains. We therefore propose a Markovian dynamics of entities beyond spacetime that projects to spacetime via decorated permutations. We show how properties of recurrent classes naturally project to properties of particles, such as spin, mass, and momentum. We propose computational experiments to obtain the momentum distributions of quarks and gluons inside protons via this projection. What dynamical entities exist beyond spacetime? No one knows. We propose an interpretation of the entities as a large social network of interacting “conscious agents,” some of which construct spacetime as a convenient user interface.

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