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Is AI like hadron physics?

Tuesday 9 December 2025 14:05 (1 hour)

Machine learning (ML) systems fueled by neural networks have entered our daily lives and led to scientific breakthroughs, but many open questions remain. After a nod toward the question of rigor with ML and recent progress, I'll turn to the theory of neural networks. I will argue that understanding neural networks inevitably leads to ideas from quantum field theory, the theoretical framework underlying much of modern physics. This connection was realized in the simplest case in the 1990s. I will then propose that the connection might be more general, an NN-FT correspondence of sorts, with neural networks providing a way to define a field theory. The apparent non-sequitur in the title will be used as a rhetorical device to explore where we are and where we'd like to go.

Presenter: HALVERSON, James