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**JEROME QUINTIN**, University of Waterloo

*Toward a non-perturbative understanding of a non-singular universe*

The field of numerical relativity has grown tremendously over recent years and led to impressive results, especially in simulations of black hole mergers, which are now observed through gravitational waves. There is more and more interest in using numerical relativity to test modifications to general relativity that would represent new physics in strong gravity regimes, such as around black holes or in the early universe. For such new theories, the challenge is often finding a well-posed formulation of the set of partial differential equations that govern spacetime geometry. We are tackling this problem for a theory called the Cuscuton, a modified gravity theory that, among other things, admits perturbatively stable non-singular cosmological solutions. To test the solution in full (i.e., non-perturbatively) will require numerical relativity techniques. In this talk, I present our recent progress in this direction.