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4D GR via triples of 2-forms

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I will describe a formalism, originally envisaged in the 1960s and 1970s, that reformulates four-dimensional General Relativity in terms of a triple of 2-forms rather than a metric. In this approach, the field equations are expressed using the exterior derivative acting on differential forms, bringing the theory structurally closer to electromagnetism than in the conventional metric formulation.
This formalism has several attractive features. The restriction to the self-dual sector of gravity becomes especially natural, and the Gravity = (Yang-Mills)^2 relation—connecting the self-dual sectors of the two theories—emerges transparently. The formalism also provides an excellent framework for perturbative computations of gravitational scattering amplitudes and leads to a remarkably compact reformulation of the Einstein equations. For instance, verifying that the Kerr black hole metric solves the field equations can be done entirely by hand within this framework.

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