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Self-excited instantons and the non-trivial structure of the teleparallel vacuum

In this talk, I will review our new approach to constructing gravitational instantons in teleparallel gravity, based on the observation that the teleparallel action can be written as a product of torsion and excitation forms. This naturally leads to the idea of considering solutions in which these two forms are equal—solutions we call self-excited, in analogy with self-dual solutions in Yang-Mills theory. These self-excited solutions turn out to be instantons, with their action fully determined by the topological Nieh–Yan term, which leads to some insights about the topological aspects of teleparallel theories. We will present some of these results and provide possible evidence for the existence of a non-trivial vacuum structure, and discuss implications for our understanding of teleparallel gravity.

Author: Dr KRSSAK, Martin (Comenius University in Bratislava)

Presenter: Dr KRSSAK, Martin (Comenius University in Bratislava)

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