

Role of matter in modified gravity: a search for new interactions

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Modified gravity theories are typically constructed in the Jordan frame, where the matter follows the geodesics of the metric. This is nothing more than a choice of field variable that leaves the observables intact. However recent developments in classical field theory revealed that fixing variables may affect how the fundamental assumptions in the theory building process are represented. For instance, the construction of “beyond-Horndeski” theories in the Jordan frame representation requires an intricate constraint analysis to exploit degeneracies, while using different variables one can obtain arguably simpler formulations within the framework of standard (i.e. Horndeski) scalar-tensor theory.

In this talk, I will adopt Bekenstein’s perspective of multiple geometries and consider two applications where a generic matter coupling unveils new interactions: i. a massive spin-2 theory; ii. a vector-tensor theory with an Abelian gauge field.

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