Phenomenological aspects of black holes beyond general relativity

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Black holes comprise a remarkably elegant set of solutions of the Einstein field equations. Aside from their rich mathematical structure, they are nowadays accepted as legitimate astrophysical objects and are routinely used in order to explain astrophysical observations. Nonetheless, General Relativity black holes were for a long time regarded with skepticism by many, even Einstein himself, as they imply infinite curvatures at their core (singularities) and infinite redshift at their horizons. Indeed, it is nowadays widely believed that quantum gravity would somehow tame core singularities, but it is far from clear if this can be done without long range (in time and/or space) effects. In this talk, I will discuss the viable options for such geodetically complete spacetimes and how we could distinguish such quantum gravity regularised black holes from the standard ones by constraining a finite set of parameters encoding deviations from GR solutions. Finally, I shall discuss the possible phenomenology we could use with a specific attention at what could be observationally done in the near future with multimessanger astrophysics.

References

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