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The effective potential in Newton's, Einstein's theories and beyond

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I shortly describe the concept of the effective potential in Newton's theory and claim that even if one does not know Einstein's general relativity, one may correctly guess the topology of the potential in Einstein's theory from Newton. This allows one to discover, without Einstein's equations, all "relativistic effects" in particles' and photons' motion around compact objects in the strong field limit. I speculate that the same may be true for quantum effects in strong gravity: even without knowing Quantum Gravity (QG) theory, one may guess all classes of all the QG effects, potentially observable in particles' and photons' motion around compact Quantum Gravity objects. This may be relevant for interpreting the EHT images (in particular secondary rings) and the LIGO-Virgo results (in particular ringdowns and echoes).

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