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Rescuing constraints on modified gravity through gravitational redshift

The distribution of galaxies provides an ideal laboratory to test deviations from General Relativity. In particular, redshift-space distortions are commonly used to constrain modifications to the Poisson equation, relating the spatial component of the gravitational field with the matter density. However, such constraints rely on the validity of the weak equivalence principle, which has never been tested for the dark matter component. In my talk, I will employ SDSS data to show that dropping this restrictive assumption leads to severe degeneracies in the parameter space. I will then demonstrate that it is possible to break such degeneracies and recover tight constraints on gravity modifications using relativistic effects in the galaxy distribution, which will be observable by the next generation of large-scale structure surveys.

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