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TITLE:

A cosmological evolutionary model for a scalar tensor theory: a confrontation between its predictions regarding light deflection and the present/future technological developments allowing to test this effect.

## ABSTRACT:

Several extensions and alternatives to General Relativity (G.R.) have been suggested, aiming to answer the objections G.R. is facing: theories including several additional (scalar) degrees of freedom and higher order (in the metric derivatives) tensor theories.

String theories are now the only consistent approach to quantize gravitation, and thus provide a possible way to unify gravitation with other interactions. They leads to an effective action containing additional degrees of freedom by comparison to G.R.. A minimal version of it consists in the scalar tensor theory first suggest by Brans and Dicke. In this version, there is only one massless scalar field (only a kinetic term is present in the gravitational action) and the coupling constant of gravity to matter is truly a constant. Alternatively, one can consider a scalar tensor theory with a non constant coupling.

Thanks to a cosmological evolutionary model for a scalar tensor theory with one scalar field, we obtain an estimation of today's value of the coupling "constant" for this theory (or equivalently, the present value of Brans-Dicke parameter " $\omega$ ").

The argument is to use a particular EXACT ANALYTICAL solution to the cosmological equations during the matter era, that we infer from the radiation era equations, and that admits G.R. as an attractor.

The obtained present value of " $\omega$ " corresponds to an estimation of the Eddington-Robertson (P.P.N.) parameter " $\gamma$ ", which is determinant in light deflection predictions.

We shall thus discuss whether light deflection predictions for this scalar tensor model are distinguishable from those of G.R., in regards to present and future technological developments allowing to test this effect. We shall mention the resolution of future astrometric satellite GAIA and the estimation of the Sun's quadrupole moment  $J_2$ .