Title : The introduction of Additional Spacetime Distortions(ASD) and New interpretations learned from it

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1 Introduction

Dark matter remains one of the most significant and perplexing mysteries in modern cosmology, posing substantial challenges to direct observation and conventional particle physics models. Despite overwhelming astrophysical evidence for its gravitational influence, This paper proposes that the true nature of dark matter can be explained by a concept: Additional Spacetime Distortions (ASD).

We define ASD as the nonlinear Overlapping of spacetime distortions arising from the temporal and spatial configurations of multiple physical matters. This phenomenon, occurring without additional mass, exhibits gravitational lensing effects remarkably similar to those attributed to dark matter. Consequently, we argue that ASD itself is the manifestation of dark matter.

2 Einstein Field Equations and Inherent Nonlinearity

We begin with Einstein's Field Equations (EFE), which describe the fundamental relationship between spacetime geometry and the distribution of matter and energy:

$$G_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$

Here, the terms are defined as follows:

- $G_{\mu\nu}$: The Einstein tensor, which encapsulates the curvature of spacetime. It is a complex, nonlinear function of the metric tensor ($g_{\mu\nu}$) and its derivatives.

- $T_{\mu\nu}$: The energy-momentum tensor, representing the density and flux of energy and momentum (including mass, pressure, and stress) that act as the source of spacetime curvature.
- G: The gravitational constant.
- c: The speed of light in vacuum.

It is crucial to emphasize that the EFE themselves are **inherently nonlinear**. This nonlinearity stems from two primary aspects:

- The Einstein tensor $G_{\mu\nu}$ is a nonlinear function of the metric tensor $g_{\mu\nu}$. When fully expressed, $G_{\mu\nu}$ contains terms involving products of $g_{\mu\nu}$ and its derivatives (e.g., Christoffel symbols (Γ) appearing quadratically in the Ricci tensor, $R_{\mu\nu} \propto \Gamma\Gamma$). This means that the geometry of spacetime affects itself in a nonlinear fashion.
- The gravitational field itself carries energy and momentum, and this energy-momentum contributes to the overall $T_{\mu\nu}$ that sources spacetime curvature. This **self-interaction of gravity** means the gravitational field not only dictates the motion of matter but also influences its own evolution, leading to a complex, nonlinear feedback loop.

3 Degree of Interaction and ASD & Dark Matter

We have discovered a characteristic pattern in dark matter phenomena. To understand and explain the nature of dark matter phenomena, this work introduces "degrees of interaction I". Although there is currently no clear methodology for quantification, this concept is considered essential to provide deep insights into the dark matter distribution.

I is also divided into Istable(Is), Imax(Im), and Inone(In).

Is is a region where the degree of interaction is appropriate and thus does not affect the distribution of dark matter, i.e., the region where ASD is stable.

Im is a region where there is a degree of interaction just before it starts to affect the distribution of dark matter. m means max.

Finally, In refers to an area where there is too much interaction in that area to allow the distribution of dark matter. In order to show its consistency, we will also describe the process of solving various problems related to dark matter that have not been solved at present.

4 The experimental method and its implications itself

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The presentation of experimental methods and what we know from experiments

The gravitational lens effect is a phenomenon in which a large celestial body bends Spacetime and change the path of light. It is generally observed in large masses such as galaxy clusters and black holes, but there is a possibility that one can artificially form an overlapping point and visualize it at a close distance. In this study, juse two massive objects are placed, spatial distortion between the two mass is checked with gravitational lenses and atomic clocks, and the artificial light source and artificial lens effect are checked, Visualization and enlargement of gravitational lens effects through an artificial way is enough possible. the fact that it can be confirmed in all directions means that space-time distortion can be viewed in three dimensions. We've only seen it in one direction so far

A new method is presented for black hole observations

It is a very difficult task to observe the internal mass from the effect of the gravitational lens. Then you can change your perspective and find Additional Spacetime Distortion. There is a very high probability. During the interaction of two black holes, their respective Spacetime distortion points are quite wide and strong. Even a slight overlap between these distortions is expected to reveal the effect, though such an event may be very short-lived. Nevertheless, the ability to deduce information about their internal mass holds significant theoretical importance.