

سمینارهای گروه گرانش و کیهان‌شناسی

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موضوع

Massive static gravity instead of dark matter

چکیده

We propose a static massive gravity as an alternative one to explain the flat rotation curves of spiral galaxies. Newtonian gravity is massless and decreases as $1/r^2$. This is too steep a decrease to explain the flat rotation curves of spiral galaxies. A massive gravity, on the other hand, has $1/r$ behavior and is capable of doing the job.

Method. Massive fields have a respected record in the history of field theories. We follow the suit and add a mass term to the field equation of the Newtonian gravity, which to begin with, is a static one. Next we use the observation based Tully-Fisher relation to determine the parameter of the added mass term.

Results. The proposed massive gravity can produce rotation curves flat enough to justify the observational data up to several optical radii of the galaxies, where observations are both abundant and reliable. At very far distances, however, the massive gravity exhibits novel features. It goes over a sequence of intermittently attractive and repulsive phases, a welcome feature that enables one to address the wavy fluctuations and patchy voids on rotation curves. With a stretch of imagination, the massive gravity may even find an observational support in Oort clouds, the spherical shell of debris at farthest outreaches of the solar system.

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