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# GRAVITATIONAL LENSING BYWORMHOLES IN BINARY SYSTEMS

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Lensing by wormholes has been explored by several authors and the demagnification effect has been found as a distinctive signature which is not present in lensing from ordinary matter.

We study compact objects made up by ordinary and exotic matter in binary systems with $1/r^n$ potentials, where $n = 2$ corresponds to the Ellis wormhole, both in the symmetric case, where the two lenses have the same index $n$, and in the asymmetric case in which the lenses have different indexes $n$ and $m$.
These mixed binary lenses are important from the astrophysical point of view also in the investigation of pairs of galaxies with different halos, or in the case in which one object is made up of exotic matter and the other one is a normal star. Another point of relevance is the proof that a deflection with $n > 1$ would be the signature of a violation of the weak energy condition and that it also implies an effective negative surface-mass density.

In our investigation we have found the presence of a pseudocaustic in the $n = 0$ limit and that an elliptic umbilic catastrophe exists for $mn < 1$. We derive analytical and numerical approximations for the three cases analyzed (close, intermediate and wide separation) in order to have a deeper understanding in the caustic evolution, in its shape and size.

The model described here is able to open a new channel in the search for these mysterious objects when they appear in a non-isolated environment.

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