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**An analysis of the gravitational waves null memory** MARIA BABIUC, Marshall University — A direct detection of gravitational waves will happen when a permanent change is induced in the detector, which is well known as a memory effect. Recently, an addition memory effect was proved possible, due to the energy of the gravitational radiation escaping to null infinity. Electromagnetic waves contribute to this memory effect, by coupling with the gravitational waves. This new type of memory was called "null memory," because both gravitational and electromagnetic radiation travel on principal null directions (light rays), which are characteristic surfaces of Einstein and Maxwell equations. In order to understand better this type of memory and it's significance to the direct detection of the gravitational waves, we present an analysis of the electromagnetic and gravitational radiation energy in the fully nonlinear Einstein-Maxwell theory, in a characteristic space-time described by the Bondi-Sachs metric. In this characteristic framework, we deduce expressions describing the gravitational and electromagnetic radiation polarization patterns at null infinity, as well as the nonlinear effects of the interaction between them, that could in principle be detected as a "null" memory in the Cosmic Microwave Background.

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