

# Gravitational waves in cosmological spacetimes and memory effect

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## ABSTRACT

*We show initial data for gravitational axial waves, that are twice differentiable but which are not  $C^2$ . They generate wave pulses that interact with matter in the radiation cosmological era. This forces the radiation matter to rotate. This rotation is permanent — it persists after the passage of the gravitational pulse. The observed inhomogeneities of the cosmic microwave background radiation put a bound onto discontinuities of superhorizon metric perturbations. Smooth initial perturbations that are at least  $C^2$  give rise to gravitational wave pulses that do not interact with the background during the radiation epoch. [1].*

## References

- [1] Wojciech Kulczycki and Edward Malec, *Axial gravitational waves in FLRW cosmology and memory effect*, arXiv:1706.09620