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## On the Interaction Between Electromagnetic, Gravitational, and Plasma Related Perturbations on LRS Class II Spacetimes

*Wednesday, 7 July 2021 11:20 (20 minutes)*

I will talk about a recent work, where we have investigated the interaction between electromagnetic, gravitational, and plasma related perturbations on homogeneous and hypersurface orthogonal LRS class II spacetimes. By using these spacetimes, which allow for the inclusion of a non-zero magnetic field, as backgrounds in a perturbative approach, we are able to see interactions between the electromagnetic and gravitational variables already to first order in the perturbations. This is in contrast to earlier works using FLRW backgrounds, where one is usually faced with going to second order in the perturbations. To get the equations governing our perturbations, we use a  $1 + 1 + 2$  covariant approach and gather relations from the Ricci and Bianchi identities, Maxwell's equations, particle conservation, and energy-momentum conservation for the individual plasma components. After linearising these equations around a LRS background, performing a harmonic decomposition, and using the MHD approximation for a cold plasma, we then arrive at a closed system for the first order perturbations. This system, consisting of ordinary differential equations in time and a set of constraints, is then reduced to two separate subsectors, containing seven and nine variables respectively. These results could be of interest when considering the large scale cosmic magnetic fields, as their origin still seems to elude us.

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