Contribution ID: **205** Type: **Talk in a parallel session**

Electromagnetic Oscillation in Cold Plasma in Higher Dimensional Spacetime

The Einstein–Maxwell and the electrodynamical equations are written for a (d+1)-dimensional FRW-like spacetime in the presence of plasma with the help of a wellknown (3 + 1) decomposition formalism given by Thorne and Macdonald. Actually this work is the generalisation of earlier one by Holcomb and Tajima[2].
We have studied the propagation of an electromagnetic wave in cold plasma in higher dimensional spacetime in the presence of an ambient and homogeneous magnetic field, both parallel and perpendicular to the wave propagator[4]. We assume the plasma medium to be cold so that the pressure can be neglected when considering the particle equation of motion.
In the presence of an external magnetic field many interesting oscillation modes manifest themselves. A simplified Appleton–Hartree type of solution generalized to higher dimensions is obtained in curved spacetime. Only a selected range of frequencies are available for propagation here for the case of the magnetic field parallel to the propagation vector. The permittivity-tensor where the dielectric constant scalar transforms into the second rank tensor. The refractive index of the plasma medium is also studied. The cyclotron frequency was calculated which decays with time where dependance of dimensions was also observed. There is no fixed resonant frequency as in the Newtonian case and it changes with time. Again, the condition of evanescent wave was discussed. It is also found that the propagation of the electromagnetic wave is more restricted in higher dimensions than the usual 4D. The well-known phenomenon of Farday rotation is also studied which has interestingly many important astrophysical implications.
The dispersion relations were discussed for both ordinary and extraordinary wave when the magnetic field is perpendicular to the propagation vector.
References:

1. K A Holcomb and T Tajima, Phys. Rev.D 40 (1989) 3809
2. D Panigrahi and S Chatterjee, JCAP08 (2008) 032

Primary author: PANIGRAHI, Dibyendu (Netaji Nagar Day College, Kolkata 700092)

Presenter: PANIGRAHI, Dibyendu (Netaji Nagar Day College, Kolkata 700092)

Session Classification: Spectral and temporal properties of accretion flows and jets around compact objects and the theoretical models

Track Classification: Accretion (AC): Spectral and temporal properties of accretion flows and jets around compact objects and the theoretical models