Weak lensing in a plasma medium and gravitational deflection of massive particles using the Gauss-Bonnet theorem. Infinite and finite distance corrections and lensing observables.

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We apply the Gauss-Bonnet theorem to the unified study of light rays in a plasma medium in a static and spherically symmetric gravitational field and timelike geodesics followed for test massive particles in a spacetime with the same symmetries, increasing in this way the range of applicability where the Gauss-Bonnet theorem was originally conceived[1]. We also present new relevant formulas that relate the expressions for the deflection angle taking into account finite distance corrections and plasma with different observables. For applications, we use this machinery to introduce lensing observables in plasma environments in different astrophysical scenarios, generalizing previously discovered results. We also consider the presence of an inhomogeneous plasma media introducing as applications of our general formulas explicit expressions for the deflection angle for the extended solar corona plasma for arbitrary big elongation angle. This presentation is based in [2], [3] and work in progress.

REFERENCES

[1] *Applications of the Gauss-Bonnet theorem to gravitational lensing.* G W Gibbons, M C Werner Class.Quant.Grav.25:235009,(2008).

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