ID de Contribution: **50** Type: **Non spécifié**

Magnetic Wilson loops in the classical field of high-energy heavy-ion collisions

jeudi 15 janvier 2015 12:29 (14 minutes)

The field configuration in the first moments of high-energy heavy-ion collisions is represented by strong longitudinal chromo-electric and chromo-magnetic fields. The form of these fields is obtained by solving the classical Yang-Mills equations of motion for two color charge sheets passing through each other with appropriate boundary conditions on the light cone. We calculate perturbatively the expectation value of the magnetic Wilson loop operator in the first moment of the collision. For the magnetic flux we obtain a first non-trivial term that is proportional to the square of the area of the loop. The result agrees with numerical calculations for small area loops. Screening effects are not present in the analytical calculation. A numerical result for larger loops gives an area law behavior of the flux, which indicates existence of independent magnetic vortices over distance scales up to few times the inverse saturation scale.

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Classification de Session: QCD-2