Abstract Submitted
for the APR09 Meeting of
The American Physical Society

Deep inelastic and dipole scattering on finite extent $\mathcal{N}$=4 SYM plasma[1] BOWEN XIAO, Lawrence Berkeley Lab, ALFRED MUELLER, Columbia University, ARIF SHOSHI, Bielefeld University — Deep inelastic scattering of $\mathcal{R}$-currents and the scattering of a small dipole on finite length hot $\mathcal{N}$ =4 SYM matter are discussed. In each case we find the scale when scattering becomes strong is determined by a saturation momentum $Q_s^2 \sim LT^3/x$ where L is the length of the matter and $x = Q^2/2qT$. Using AdS/CFT correspondence, we calculate the structure function F_i in finite length hot matter when $Q^2 \ll Q_s^2$. For infinite length matter the series generated by the OPE is not Borel summable but we are able to determine the exponential part of the tunneling amplitude determining F_2 when $\frac{Q^2}{Q_s^2} \gg 1$ from the position of the singularity closest to the origin on the real axis of the Borel plane. In finite length matter the OPE series is not convergent but it is Borel summable. When a small dipole of size x_0, and the string connecting the ends of the dipole, pass through hot matter there is an induced motion of the string in the 5^{th} dimension. We find that the energy of the string in the dipole rest frame gains a kinetic part(KE) in addition to the Coulomb potential V. When $T^4 L\gamma x_0^3 \sim \mathcal{O}(1)$, we find $E > 0$ and there should be strong radiation and dipole dissociation which gives a limiting dipole size $x_L \simeq 1.1\frac{1}{\pi T(\gamma\pi TL)^{1/3}}$ for a finite length plasma.

[1]This work is supported in part by the US Department of Energy.

Bowen Xiao
Lawrence Berkeley Lab

Date submitted: 09 Jan 2009 Electronic form version 1.4