Dileptons from Disoriented Chiral Condensates*

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Recently much attention has been devoted to the phenomenon of so called disoriented chiral condensates (DCC) [1] . However, many of the suggested signatures for the existence of DCC states involve the measurement for pions and are thus subject to strong final state interactions in the hadronic phase. We have shown that the formation of DCC states in ultra-relativistic heavy ion collisions leads to a strong enhancement in the production of lepton pairs. This signal has the obvious advantage that, contrary to the hadronic signals, it will not be distorted in the hadronic phase. The basic idea is that the formation of DCC states manifests itself in a strong amplification of low-momentum pion modes. Those may annihilate and give rise to a strong enhancement in the production of dileptons within a rather narrow range in mass and momentum.

In figure 1 we show the resulting dilepton invariant mass spectrum for a scenario with DCC formation (denoted as 'Quench') in comparison with the standard signal from pion annihilation (denoted as 'Thermal'). Clearly, a strong enhancement (factor 100) at invariant masses close to $M_{inv} \simeq 2m_\pi$ can be seen. This enhancement is also confined to small transverse momenta $p_t \leq 300\,\text{MeV}$.

We have also investigated to which extend this signal is measurable by current dilepton experiments. Assuming a Pb+Pb collision at SPS-energies the signal will not be covered by the competing η Dalitz decay.

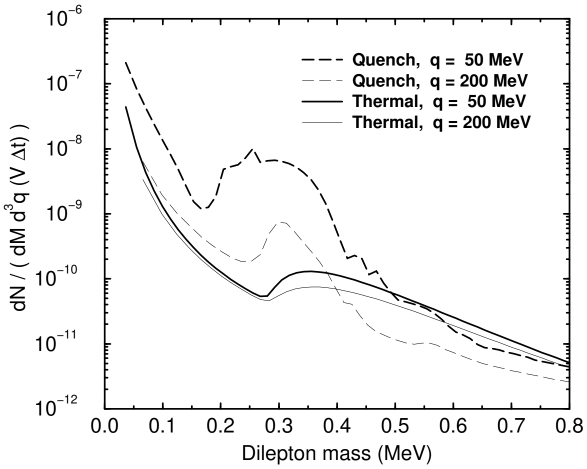

Figure 1: Dilepton invariant mass spectrum for Au+Pb collisions at 156 A GeV. The data are from [6]. Only statistical errors are shown.

However, using the present CERES [2] acceptance cuts, the DCC dileptons, if present, hardly contribute to the invariant mass spectrum and thus is not responsible for the enhancement reported by CERES. This is due to the fairly large transverse momentum cuts of 200 MeV/c. However, if CERES would be able to lower the transverse momentum cuts to about 50 MeV/c, the signal should be visible.

[1] J.P. Blaizot and A. Krzywicki, Acta Phys. Polon. 27 (1996) 1687.
[2] G. Agakichiev et al., Phys. Rev. Lett. 75 (1995) 1272.

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