

# Cyclotron Colloquium, Monday, May 22nd, at 1:30 pm

"Dilepton production at SPS and RHIC energies"

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## Abstract:

Analysis of SPS and RHIC data have established that collisions of heavy ions have created matter at a temperature of about 4 trillion degrees Celsius, higher than the temperature needed to melt protons and neutrons into a plasma of quarks and gluons. Lepton pairs provide sensitive penetrating probes of the hot quark matter produced. Using the microscopic parton-hadron-string dynamics (PHSD) transport approach, we perform the calculation of the dilepton production in heavy ion collisions. Comparison to the data of the NA60 and PHENIX Collaborations (double differentially in mass and  $p_T$ ) allows us to determine the relative importance of different hadronic and partonic sources in the dilepton production history. In elementary nucleon-nucleon collisions, the dominant sources of dileptons are decays of mesons. In heavy ion collisions, the experimentally measured yield of dileptons is significantly modified compared to the predictions based on the elementary reactions. The effect is a combination of: i) a modification of meson properties in medium, ii) the direct dilepton radiation from the quark-gluon-plasma, and iii) the contribution of meson-meson or multi-meson interactions (e.g. pion-rho, four-pion interaction, etc). We have studied all the three mechanisms within the PHSD transport approach. In particular, the role of the four-pion interaction is estimated by implementing the processes  $\pi + a_1 \rightarrow e + e^-$ ,  $\pi + \omega \rightarrow e + e^-$ ,  $\rho + \rho \rightarrow e + e^-$ .