Joachim Stroth (Darmstadt, Germany)
Probing Dense Baryonic Matter with Dileptons

It is experimentally well established that extreme states of nuclear matter are formed in collisions of (ultra-)relativistic ions. Depending on collision energy and system size, the transient state can reach temperatures well above the critical temperature for a phase transition and densities several times higher then nuclear saturation density. The dense and hot system can be classified by means of bulk observables like the composition of produced particles, their momentum distribution and angular emission pattern. A particular tool to investigate the microscopic structure of the hot fireball formed in such collision is to measure the virtual photons radiated off throughout the lifetime of the system. Experimentally they accessible by means of correlated lepton pairs produced once the virtual photon materializes. Depending on the experimental conditions the best strategy can be electron pairs or muon pairs. Of particular interest is the electromagnetic decay of vector mesons into a lepton pair. Not suffering from strong final state interaction the decay leptons carry spectral information about the parent particle to the detectors.
In this lecture the experimental challenge in detecting such rare decays will be discussed. The world-wide experimental effort to obtain a full excitation function of lepton pair emission from heavy ion collisions in the energy range of 1 AGeV up to center of mass energies obtained in collider experiments will be presented. The lecture will also touch upon the connection and sensitivity of this observable to effects of chiral symmetry restoration and deconfinement. If time allows, the physics programme at the future FAIR facility in this context will be outlined.