Lecturer L4: Prof. Johann Rafelski

First Lecture: Hot Quark and Nuclear Matter in full Thermo-Chemical Equilibrium: Similarities and Differences
Two phases of hadronic matter: Quark matter and nuclear matter at finite baryon density and temperature; physical properties of both phases; hot fireballs formed in relativistic nuclear collisions; final state made of same particles no matter what happened; can we distinguish between quarks and nucleon states of matter? Why is quark matter called "a new phase of matter". What is new?

Second lecture: Hot Quark and Nuclear Matter: Strangeness production and evolution
A short catalog of observables of deconfined state of matter. Focus on strangeness and comparing to charm flavor: flavor cooking in quark matter and nuclear matter. Comparison of equilibrium state in both phases – hadrons must emerge in chemical nonequilibrium. Does collision energy matter – onset of deconfinement also a function of collision system size.

Third lecture: Quark-Gluon Plasma Hadronization Process: Strange hadron signature of deconfinement
Hadronization process of QGP: Strong interactions, Fermi statistical model, phase space dominance. Particle spectra: rapidity, transverse momentum; particle yields statistical hadronization model (SHM). Microscopic constraints; data analysis. Bulk properties of the source measured.

Fourth lecture: Quark-Gluon Plasma Hadronization Process: Interpretation of strangeness experimental results
Experiments at GSI, AGS, SPS, RHIC, LHC – common features and differences across three orders of magnitude energy range. Strangeness per entropy, multistrange hadrons, strange antibaryon enhancement. Production of QGP in large and small systems and low and high energy.