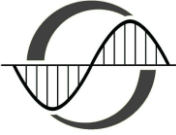




UNIVERSITÀ
degli STUDI
di CATANIA



DIPARTIMENTO DI FISICA E ASTRONOMIA
“ETTORE MAJORANA”

DOTTORATO DI RICERCA IN FISICA
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Strong Interactions at Finite Temperature and Density

3 CFU

VINCENZO GRECO

Email: greco@Ins.infn.it

Office: Department of Physics and Astrophysics, Building 6, Room 346

Telephone: +39 095 3785403

Reception hours: send an e-mail to greco@Ins.infn.it

Program of the course:

Basic ideas and concepts of Strong Interactions: asymptotic freedom and confinement. Quantum ChromoDynamics (QCD) a general overview: perturbative and non-perturbative regimes. Chiral symmetry phase transition and NJL lagrangian.

QCD phase diagram of nuclear matter at finite density and temperature. Relativistic gas and bag models. Equation of State of the quark-gluon plasma and its transport coefficients. Basic relativistic thermodynamics and fluid dynamics of the phase transition from hadronic matter to the Quark-Gluon Plasma (QGP). Applications to Early Universe and Neutron stars. Impact of the QGP in the expansion of the Early Universe and in the evolution of ultra-relativistic collisions. Particle production in relativistic pp, pA, AA collisions phenomenology.

Bibliography:

- “An Introduction to Quark and Gluons”, F. E. Close, Academic Press London, 1979.
- “Handbook of Perturbative QCD”, G. Sterman et al., Review of Modern Physics 67 (1995) 158.
- “Quark-Gluon Plasma”, K.Yagi, T. Hatsuda and Y Miake, Cambridge University Press, 2005.