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COLLOQUIA DI DOTTORATO, A.A. 2021/2022

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Dipartimento di Fisica, A101  
Giovedì 28 Aprile 2022 ore 16:00

***Phase Transition and Properties of the  
Hot QCD Matter Created in Ultra-  
Relativistic Collisions***

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The ordinary nuclear matter at high temperature ( $T > 10^{12}$  K) should undergo a transition to a plasma of quark and gluons (QGP), as now predicted by Quantum ChromoDynamics (QCD) at finite temperature. This state of matter, that have permeated the first microseconds of the Early Universe, can be created for transient of time ( $10^{-22}$  s) in ultra-relativistic heavy-ion collision at RHIC and LHC colliders.

In the first part of the seminar, some basic scales and degrees of freedom of this research area will be reviewed, emphasising how over the years it has become possible to “see” inside the created matter probing its substructures at finer and finer scale.

In the second part of the seminar, the focus will move on the dynamics of the heavy quark in QGP, showing how the first results has shown a strong non-perturbative interaction inducing transport properties in agreement with the expectation from lattice QCD. In the conclusion, emerging studies on the impact of the huge initial electromagnetic fields ( $10^{18}$  Gauss) on their dynamics will be discussed.

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*The seminar is in presence up to the maximum occupancy of A101 room.*