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CHIC (Charm in Heavy Ion Collisions): An experiment to measure charm production at the CERN SPS

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Twenty five years ago, CERN pioneered the study of quarkonium production in heavy ion collisions at the SPS with the aim of characterizing the QGP phase transition and testing lattice QCD predictions. In 1997, the NA50 experiment observed an anomalous suppression of J/ψ production in Pb+Pb collisions. Since then, these quarkonium studies have been extended to regimes of significantly higher energies as reached at BNL-RHIC and CERN-LHC. In addition with the results obtained at RHIC on J/ψ and more recently at LHC on quarkonium states, hints of the theoretically expected sequential suppression start to emerge.

Nevertheless, the experimental validations of such a scenario as well as the characterization of the phase transition require full control of the feed-down sequence. In particular, a precise measurement of quarkonium 1P states which significantly contribute to the yields of quarkonium 1S states is mandatory. For charmonium, the measurement of χ_c production together with J/ψ and ψ' is needed to prove the sequential suppression scenario.

For this purpose, we propose a new experiment at the CERN SPS, which makes use of modern ultra-granular technologies to perform the measurement of $\chi_c \rightarrow J/\psi + \text{photon}$ in Pb+Pb high multiplicity collisions.

In this talk, after a quick reminder of the physics case, we describe the proposed apparatus and present its expected performances.

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