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Geometrically Driven Phase Transition in Finite Size (Casimir like) Systems

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Following the recent development of a finite size thermal field theoretic formalism, meant to probe small size corrections to the Quark-Gluon Plasma (QGP) thermal properties, we investigate such thermal "Casimir" (geometrically confined) systems, in the thermodynamic limit, when isolated. We find and present in detail the characteristic behavior of a second order phase transition (unusually) – driven by the size of the system – with a divergent isoenergetic compressibility, calculated from first principles, at a critical length $L_c \sim 1/T$. Finally, we comment on the relevance of these findings for the subsequent phenomenology of QGPs, such as those created in modern Heavy Ion Collisions (HIC), with respect to future calculations and interpretations of physical observables characterizing the presence of a QGP in HIC.

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