



Sommerfeld Theory Colloquium

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The erasure of topological defects and the saturation phenomenon

Interesting erasure phenomena arise from interactions between lower-dimensional and higher-dimensional objects and impact cosmology and fundamental physics. In the first part of the colloquium, I will examine the case for topological defects, revealing insights into the interactions of magnetic monopoles, cosmic strings, and domain walls.

For objects like cosmic or QCD flux strings, encounters with domain walls or D-branes result in erasure through coherence loss during collisions, introducing a new string break-up mechanism. The collisions between magnetic monopoles and domain walls in an $SU(2)$ gauge theory lead to monopole erasure, which is pivotal in post-inflationary phase transitions and potentially solves the cosmological monopole problem. Simulations show that strings or monopoles cannot penetrate domain walls. Entropy-based arguments highlight the significance of the erasure phenomena that can produce correlated gravitational waves and electromagnetic radiation, impacting cosmology and astrophysics.

The second part of the colloquium focuses on the saturation of unitarity and the emergence of Saturons. These self-sustained objects, which reach the maximal entropy allowed by unitarity, resemble black holes.

I discuss a "black hole-saturon" correspondence in a renormalizable $SU(N)$ invariant theory. Despite lacking gravity, saturons show features like an information horizon, Bekenstein-Hawking entropy, thermal evaporation, and a characteristic information retrieval time. This correspondence has significant implications for black hole physics and saturated systems. We will examine recent results on saturon mergers, vortices in black holes, and primordial black holes, offering new perspectives on fundamental theory and observations.

Wednesday, 26 June 2024, 16:15h, Room A348, Theresienstr. 37/III

Prof. Gia Dvali