Theory of Elementary Particles, Astroparticle Physics, and Phenomenology (TEPAPP) Seminar

Wednesday, January 11th @ 4:45PM
PAB 4-708

"Axions in the post-inflationary scenario: from strings to miniclusters"

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Abstract: In the scenario in which the QCD axion is born after inflation, the Universe is filled with a highly inhomogeneous scalar field that evolves in a nonlinear fashion. Understanding the eventual abundance and distribution of axionic dark matter in this scenario therefore requires dedicated numerical simulations. In this talk we will summarize our study on the complex dynamics of the axion field, in chronological order with cosmic time, from the scaling of cosmic strings, the formation of domain walls and axitons, and the gravitational formation of miniclusters. We discuss the numerical methods and potential problems involved with simulating post-inflationary axions and how comparing with generic axion-like particles (ALPs), the dark matter production changes substantially. We describe the distribution of dark matter axions well after matter-radiation equality and what are the implications for axion direct detection experiments.