

ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΟΝΙΚΗΣ

ΤΜΗΜΑ ΦΥΣΙΚΗΣ

ΣΕΜΙΝΑΡΙΟ

ΤΟΜΕΑΣ ΑΣΤΡΟΦΥΣΙΚΗΣ, ΑΣΤΡΟΝΟΜΙΑΣ ΚΑΙ
ΜΗΧΑΝΙΚΗΣ

Θέμα: **The Dynamics of Grand-Design Morphologies in Disk Galaxies**

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Ημερομηνία: **Πέμπτη** 16-10-2025, 10:00 π.μ.

Τόπος: **Εργαστήριο Αστρονομίας, ΑΠΘ**

Περίληψη:

Disk galaxies mainly show two large-scale features — bars and spiral arms. From a dynamical point of view, we can think of these as perturbations on top of an axisymmetric background potential. Each of these structures rotates with its own pattern speed, while the stars in the disk move at different angular velocities, depending on their distance from the galactic center.

In my talk, I'll explain why the pattern speed and the strength of the bar or spiral are the most important parameters that shape both the dynamics and the appearance of disk galaxies. These quantities set the positions of the main resonances in the disk, which in turn determine where the main star-forming regions appear and how gas flows toward the center. The pattern speed is also affected by the dark matter halo, so it can tell us something about how dark matter is distributed around the disk.

I'll also show results from recent fully self-consistent N-body simulations, where non-barred grand-design spiral patterns remain stable for about 2.5 billion years. The simulations use the GADGET-3 code and include both stellar and gaseous components, all embedded in a live dark matter halo. What we find is that the prominent, symmetric inner spiral arms extend between the inner Lindblad resonance (ILR) and the inner 4:1 resonance, providing a clear dynamical explanation for the grand-design structures we see in real galaxies.