

---

## SEMINARIO

**Jesús Dueñas Pamplona**

*Universidad de Valladolid*

***Nonautonomous scalar bifurcation theory  
meets critical transitions in d-concave  
equations***

**Abstract:** This talk presents nonautonomous saddle-node bifurcations as a source of critical transitions, which are abrupt changes in the state of a complex system triggered by small variations in inputs. The framework discussed is inherently nonautonomous, enabling the study of models where external factors, ranging from Earth's rotation to seasonal changes, significantly influence the evolutionary laws. Specifically, we will examine scalar equations that asymptotically approximate equations with concave derivative (d-concave equations), which are particularly relevant in the mathematical modeling of the Allee effect. Additionally, we will demonstrate how finite-time Lyapunov exponents can serve as early warning signals for critical transitions in these models.

This is joint work with Iacopo P. Longo, Carmen Nuñez and Rafael Obaya.

**Seminario del IMUVa, edificio LUCIA  
Lunes 8 de Julio de 2024 (12:00)**

