Title of the talk*:* **Observability and control of parabolic equations on networks**

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Abstract:

During the last decades, the use of networks has been very helpful and effective in the study of pipes, neural systems, the flow of traffic on roads, the global economy or the human circulatory systems.

In this talk I would like to show you a contribution to this area from the fields of control theory and inverse problems. We will consider the propagation of diffusion on a network with loops. Our objective is to control these networks by acting on the system that models the process of the heat diffusion in them, both by open-loop and closed-loop controls, extending in this way the results of [2] and [3] to networks with loops.

The observability of the entire network will be achieved under certain hypotheses about the position of the observation domain. This will be done using a Carleman inequality. Then, we will use that observability to prove the null controllability of the network and to obtain the Lipschitz stability for an inverse problem consisting of retrieving a stationary potential in the heat equation from measurements on the observation domain.

This work has been done in collaboration with Jon Asier Bárcena-Petisco, from the University of the Basque Country, and is based on the article [1].

References:

[1] J. Apraiz and J. A. Bárcena-Petisco, Observability and control of parabolic equations on networks with loops, Archive ouverte HAL, *hal-03501343v3* (2022), https://hal.science/hal-03501343v3.

[2] J. A. Bárcena-Petisco, M. Cavalcante, G. M. Coclite, N. Nitti and E. Zuazua, Control of hyperbolic and parabolic equations on networks and singular limits, hal-03233211 (2021).

[3] L. Ignat, A. F. Pazoto and L. Rosier, Inverse problem for the heat equation and the Schrödinger equation on a tree, Inverse Prob. 28, 1, (2011), 015011.