

## Physics-aware deep learning approach to inverse problems in cardiac electrophysiology

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**Abstract:** The inverse problem of reconstructing cardiac electrical activity from electrocardiogram (ECG) measurements is very challenging due to its ill-posedness and the computational complexity of its numerical approximation.

In this talk, we present our approach to this inverse problem, which combines dimensionality reduction techniques with autoencoders equipped with physics-aware regularizations. The resulting physics-aware neural network features high-efficiency thanks to low-complexity architectures characterized by a small number of hyperparameters. Furthermore, it balances partial measurements with numerical data, encoding the knowledge of the physical laws governing the phenomenon.

This work is in collaboration with R. Tenderini (EPFL), S. Deparis (EPFL), and A. Quarteroni (Politecnico di Milano-EPFL).