TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

Dipartimento di Fisica

**European Research Council**
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# *Seminar*

**Tuesday, 17 JUNE 2025 - h. 14:30**

*Sala Grassano (Dipartimento di Fisica)*


## Dr. Gianmarco Guglielmo

*Università di Roma Tre*


# *"DL in flood predictions: limitations and challenges"*


### *Abstract*

Deep learning models have been increasingly applied to flood hazard prediction, primarily due to their computational speed advantages over traditional numerical models. However, a major limitation of current DL-based flood models is their poor generalization capability. Retraining is almost always required for each new study area, which severely restricts their practical applicability. Furthermore, the black-box nature of DL models poses additional challenges, potentially leading to unphysical predictions and reduced reliability in hydraulic applications. In our work, we augmented the loss function by introducing a regularization term based on relevant physical quantities, in addition to the standard data-driven loss. These encoded physical terms are intended to guide the model in capturing a broader range of hydrodynamic behaviors and relationships inherent in the data. We first validated the proposed methodology on a simplified toy model, and we are currently testing its effectiveness on a more complex CNN-based flood prediction framework applied to completely unseen new catchments.



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***(P.I. Prof. Luca Biferale)***