Model and data fusion: physics-driven learning in cancer research

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The key role of physical and mechanical interactions in cancer emerges from a very large variety of data sources and methods - from genomics to bioimaging, from proteomics to clinical records. Thus, learning physics-driven relational information is crucial to characterize its progression at different scales.

In this talk I will discuss how mathematical and computational tools allow for learning and better understanding of the mechano-biology of cancer, thanks to the integration of patient-specific data and physics-based models. I will present a few applications developed in the last decade in which the development of digital twins, empowered by ad-hoc learning tools, allows us to test new hypotheses, to assess the model predictions against biological and clinical data, and to aid decision-making in a clinical setting.