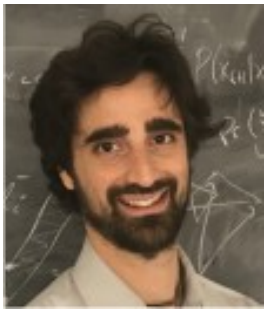
NITheCS
National Institute for
Theoretical and Computational Sciences

# NITheCS Mini-school
## Wednesday 9, 16, 23 & 30 March 2022, 16h00 – 17h00

Prof Fabio Anzà (Research Assistant Professor, InQubator for Quantum Simulations, University of Washington & Templeton Research Fellow, University of California, Davis)

## ‘Geometric Quantum Mechanics of finite-dimensional systems’




### ABSTRACT

The wonderful development of digital and nanoscale technology of the past 20 years has led to a new wave of interest for quantum-information-processing technologies. While the landscape is broad, a common goal of crucial relevance is to build a comprehensive understanding of how complex (many-body and out of equilibrium) quantum systems can exchange, store and process information. This is a huge, community-wide, effort that requires both experimental and theoretical advances to build a clear path towards the understanding and control of complex quantum phenomena. It is therefore appropriate to aim beyond the existing paradigms and tools of analysis to explore new ways of understanding quantum phenomena. I will argue that Geometric Quantum Mechanics (GQM) is one of such promising ways.

GQM is a formulation of quantum mechanics based on differential geometry which leads to interesting implications, new tools of analysis and, most importantly, new ways of thinking about quantum phenomena. With this perspective in mind, in this lecture series I will present the basics of Geometric Quantum Mechanics (GQM), a quick review of its historic development, some applications, and interesting future directions.

Only preliminary knowledge of Standard Quantum Mechanics is required. Prior knowledge of differential geometry is not necessary or required.


### BIOGRAPHY

Prof Anzà is currently Research Assistant Professor at the University of Washington, where he works within the newly established InQubator for Quantum Simulations. He is also a Templeton Research Fellow at the Complexity Sciences Center, University of California, Davis.

He holds a PhD from the University of Oxford, UK, where, under the supervision of Prof V. Vedral, he exploited quantum information theory to study the emergence of thermal equilibrium phenomenology in out-of-equilibrium quantum systems and microscopic models of quantum gravity.

Currently, his research is focused on modelling the out-of-equilibrium phenomenology of many-body quantum systems, where quantum fluctuations, collective phenomena and information processing cannot be neglected, thus exhibiting a highly non-trivial interplay.

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