



## Roberto Cappuccio

Place of birth: Bergamo (BG) – Italy (but I live in Tuscany)

Nationality: Italian

Languages: Italian and English

About me: I play piano, I am a passionate traveler, and practitioner of all watersports: swimming, free diving, scuba diving, kayaking, and surfing (at least just trying to...)

### Education

I studied at Italian «Classical» high school (Latin and Greek), but I took my degree in theoretical physics just *some* years ago (☺) on Braid Statistics and Link Invariants in Chern-Simon's Theory.

I acquired coding skills in various programming languages during 20+ years of experience with major consulting firms.

Now, I am focused on quantum computing and quantum machine learning.

# PhD Project Information

Generative adversarial networks (GANs) are a <relatively> recent and popular class of generative models with the capability of reproducing accurately data in various machine learning tasks. (Ian J. Goodfellow et al. Generative Adversarial Networks. 2014. arXiv).

I want to explore if a quantum computing version of GANs can implement effective physics simulation for High Energy Particle and Astro-Particle Physics.

Various approaches already tested: going in the direction of a full quantum GAN model using IBM real devices (in fig. alongside, a 23 params example of full QGAN – F.Rehm et alii <https://arxiv.org/pdf/2305.07284.pdf>).

