Dear Caterina Doglioni,

I'm Simone Azeglio, a Physics of Complex Systems master student at the University of Turin. This degree is mainly focused on Statistical Mechanics, Dynamical Systems and Stochastic Processes but I'm particularly interested in Machine Learning and its application on Science and Society. That's why I've attended different classes, on these topics and matured a relevant knowledge by working on several external projects.

Concerning Machine Learning, more than a year ago I've set up and organized the first students association at the University of Turin. This project aims to bridge the gap between students and researchers by exploring state-of-the-art Machine Learning techniques. We're undertaking several research projects, all of them have a relevant impact on society. We've started by tackling Deep-Fakes with a strategy based on Siamese Networks and Temporal Convolutional Networks.

Currently, with respect to Covid-19, we're facing a macro-project called "Datameron" - yes, I'm Italian, and there's a reference to Boccaccio's "Decameron", in this way I hope to attract both technical and non-technical audiences - which can be split in three branches: the first explores the relations between AI and Medical Diagnosis, by developing computer vision techniques in order to work on X-Rays and CT scans (thanks to this project I've been admitted to HelloAIRIS, a training program from EITHealth for AI in Healthcare). The second one focuses on NLP applications on CORD-19: we're devising a multi-hop answering algorithm in order to gather information from different documents for question answering purposes. The last one, is based on Multi Agent Sytems and on introducing Graph Neural Networks in epidemic spreading modelling in order to find whether they can "predict" the overall behavior of the pandemic.

I've always thought that by being a physicist, some duties come along with the tools that we built in our studies. The "master duty" is, for sure, to give back significant insights to the society in which we live and at the same time, use mathematical tools and modeling for social good.

Recently, I also had the chance to introduce the University of Turin into the first international competition on Climate Change & AI, ProjectX2020, organized by the University of Toronto. I mentored a group of undergraduate students and our work lead to a preprint (currently available on arXiv, ID 2012.06825) focused on Physics Informed Neural Networks for wildfire spread. Scientific Machine Learning, in my opinion, is one of the most promising frameworks nowadays: an equation is worth a thousand datasets.

My main interest, in this sense, is understanding representation learning in its essence, Autoencoders are one of the most important architectures when talking about unsupervised learning and effective information compression. That's why I'm much interested in the "Deep Autoencoders for ATLAS data compression" project as part of the GSoC 2021.

CERN is worldwide known as a hotbed of revolutionary knowledge and I personally consider it as a place where critical thinking can be built in a substantial manner. As an early career researcher I'm also sure about the fact that continuous stimuli are needed to boost both scientific knowledge and creativity, which is the founding element, the first brick in Science.

In this brief exposure, I've tried to depict my personality, which gravitates towards hard-work, resilience and creativity. I've always tried to personally build the tools needed in order to solve

problems – especially if impactful –, whether there wasn’t the chance to get them ready to use, since I firmly believe in the positive impact of Science. I feel more comfortable in typically uncomfortable situations and, as a physicist, I’m definitely thrilled to face new and unsolved problems and to pull unordinary solutions out of a hat. I personally think that, as Italian students and future researchers, we’re facing a severe lack of opportunities in this sense. CERN is definitely a place where tools are available and ideas flow freely from person to person: that's why I'm highly motivated to take part in such an opportunity.

Best Regards,

Simone Azeglio