

Exascale Computing: Challenges and Opportunities

Alessandro Curioni¹

¹IBM Research Division, Saumerstrasse 4, 8803 Rüschlikon

Simulations have a growing impact on scientific & technological developments also due to the exponential increase of the computational resources we experienced in the past 20 years. In the past 10 years, the driver of this exponential increase has been the advent of massive parallelism, that helped to overcome the limited increase of speed of the elementary computational units. This trend allowed us to break the walls of Terascale and Petascale computing and made simulations the third pillar of the scientific enterprise, alongside theory and experiments. However, this is likely to change dramatically in the next five years as we move to exa-flop computers, since massively parallelism as intended today is running out of steam.

In this talk we will review the main challenges behind exascale computing and demonstrate that, if properly addressed, these challenges could drive significant innovations in the field of computing at large.