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ICSC Spoke 3 "Astrophysics and Cosmos Observations"

Tuesday 15 October 2024 16:30 (20 minutes)

The High-Performance Computing, Big Data e Quantum Computing Research Centre, created and managed by the ICSC, is one of the five National Centres established by the National Recovery and Resilience Plan (NRRP), covering designated strategic sectors for the development of the country. The Centre is organized in 11 Spokes, one dedicated to infrastructure while the remaining 10 focused on 10 distinct subject areas.

In the talk, we present Spoke 3: "Astrophysics and Cosmos Observations". Its main objectives are the exploitation of cutting-edge solutions in HPC and Big Data processing and analysis for problems of interest in the following research area: Cosmology; Stars and Galaxies; Space physics (Earth, Solar and Planetary); Radio Astronomy; Observational Astrophysics and Time Domain; High Energy Astrophysics, Cosmic Microwave Background; Large Scale Structure, Clusters and Galaxies; Multi-messenger Astrophysics; Numerical Simulations and Modeling.

All these domains require designing and implementing a full ecosystem capable of: (i) delivering complex simulations capable of high predictive accuracy to address the complexity of the Universe; (ii) exploiting and/or driving the evolution of current and future computing architectures and algorithms; (iii) exploiting the wealth of data produced by computations and observations; (iv) effectively engaging with the Astronomy, Astrophysics, and Astroparticle physics (AAA) community in the HPC environment of codes and resources;(v) adapting and implementing existing and new algorithms for the new challenging (exascale and post-exascale) HPC infrastructures; (vi) providing innovative data storage and archiving systems to face the big data challenges.

In addition, Spoke 3 undertakes a specific knowledge and technology transfer activity, coordinating a number of projects that involve industrial parteners in order to study and develop advanced AI and Visualization based solutions capable to efficiently exploit HPC, in order to boost the productivity and the effectiveness of Italian enterprises.

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