Contribution ID: **21** Type: **Data Reduction, Analysis and Visualization**

High Performance Visualization in the SPACE Center of Excellence

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Modern Astronomy and Cosmology (A&C) generate petabyte-scale data volumes requiring the development of a new generation of software tools to access, store, and process them. The Visualization Interface for the Virtual Observatory (VisIVO) tool [https://visivo.readthedocs.io/en/latest/] performs multi-dimensional data analysis and knowledge discovery in multivariate astrophysical datasets. Thanks to containerization and virtualization technologies, VisIVO has already been exploited on top of several distributed computing infrastructures including the European Open Science Cloud (EOSC). Within the SPACE Center of Excellence [https://www.space-coe.eu/] we are adapting VisIVO solutions for high performance visualization of data generated on the (pre-)exascale systems by HPC applications in A&C, including GADGET (GAlaxies with Dark matter and Gas) and ChaNGa (Charm N-body GrAvity solver) simulations.
We outline the execution strategies designed to enhance the portability and reproducibility of the VisIVO modular applications for high performance visualization of data generated on the (pre-)exascale systems by HPC A&C simulations performed with the GADGET code. Additionally, we present a solution to run the analysis and visualization concurrently (in-situ) with the simulation and bypass the storage of the full results exploiting a framework offering a highly distributed database to stream A&C simulation data for on-line visualization and demonstrate it with the ChaNGa high performant cosmological simulator.

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