

openPMD - the Open Standard for Particle-Mesh Data

The Open Standard for Particle-Mesh Data (openPMD) is a F.A.I.R. metadata standard for tabular (particle/dataframe) and structured mesh data in science and engineering.

CASUS/HZDR is developing this data standard and its flagship implementation, the openPMD-api, in close collaboration with the Lawrence Berkeley National Laboratories and further open-source contributors.

This presentation gives an overview on codes that use openPMD. This includes in-house use where the standard is applied as the I/O solution for codes such as the particle-in-cell simulation PConGPU or the density functional theory framework MALA. openPMD is further used within as well as outside the Helmholtz community, including many international codes.

CASUS and openPMD are part of the HELPMI project of the Helmholtz metadata collaboration, further tying the standard into the Helmholtz community in an explorative project to find a useful standard for Laser-Plasma experiments.

By implementing the data standard openPMD in various file standards from JSON over TOML and HDF5 to ADIOS2, the openPMD-api targets a range from simple prototyping workflows up to recent supercomputing systems, including recent full-scale runs on OLCF Frontier, the current TOP1 system in the world. This talk demonstrates how scientists can harness scalable I/O solutions on state-of-the-art systems without the mental overhead of writing low-level I/O routines.

References

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