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## **The ATLAS ROOT-based data formats: recent improvements and performance measurements**

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We detail recent changes to ROOT-based I/O within the ATLAS experiment. The ATLAS persistent event data model continues to make considerable use of a ROOT I/O backend through POOL persistency. Also ROOT is used directly in later stages of analysis that make use of a flat-ntuple based “D3PD” data-type. For POOL/ROOT persistent data, several improvements have been made including implementation of automatic basket optimisation, memberwise streaming, and changes to split and compression levels. Optimisations are also planned for the D3PD format. We present a full evaluation of the resulting performance improvements from these, including in the case of selected retrieval of events. We also evaluate ongoing changes internal to ROOT, in the ATLAS context, for both POOL and D3PD data. We report results not only from test systems, but also utilising new automated tests on real ATLAS production resources which employ a wide range of storage technologies.

**Primary author:** ATLAS, Collaboration (Atlas)

**Co-authors:** Dr MALON, David (Argonne National Laboratory (US)); VUKOTIC, Ilija (Universite de Paris-Sud 11 (FR)); Dr CRANSHAW, Jack (Argonne National Laboratory (US)); VAN GEMMEREN, Peter (Argonne National Laboratory (US)); SCHAFFER, R D (Universite de Paris-Sud 11 (FR)); BHIMJI, Wahid (University of Edinburgh (GB))

**Presenter:** BHIMJI, Wahid (University of Edinburgh (GB))

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