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## A modern approach to HEP visualization - ATLASrift

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At the times when HEP computing needs were mainly fulfilled by mainframes, graphics solutions for event and detector visualizations were necessarily hardware as well as experiment specific and impossible to use anywhere outside of HEP community. A big move to commodity computing did not precipitate a corresponding move of graphics solutions to industry standard hardware and software. In this paper, we list functionalities expected from contemporary tools and describe their implementation by a specific application: ATLASrift.

We start with a basic premise that HEP visualization tools should be open in practice and not only in intentions. This means that a user should not be limited to specific and little used platforms, HEP-only software packages, or experiment-specific libraries. Equally important is that no special knowledge or special access rights are needed. Using industry standard frameworks brings not only sustainability, but also good support, a lot of community contributed tools, and a possibility of community input in a form of feedback or direct help. Moreover, an ideal visualization tool should be accessible for non-expert people (for example for outreach and education purposes) as well as offering all the functionalities needed by the experts.

Next we share our experience developing the ATLASrift application. The application is based on the Unreal Engine, currently a gold standard in the field of interactive visualization. This gives us wide platform coverage (Linux, Windows, iOS, Android, Web browser, all VR platforms) and a seamless integration with diverse online platforms for both application delivery and multi-user support (ie. Oculus, Steam, Amazon). It makes integration of outreach oriented multimedia content - 4Pi coverage photos, guided tours, photos and videos - straightforward. We describe the usage of a web-based service to import the detector description geometry, in order to ensure high performance even for the most demanding platforms. We present the ATLASrift user interface, which proves that the expert and the outreach functionalities of the application are not mutually exclusive.

**Primary authors:** VUKOTIC, Ilija (University of Chicago (US)); BIANCHI, Riccardo Maria (University of Pittsburgh (US))

**Presenter:** VUKOTIC, Ilija (University of Chicago (US))

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