



Contribution ID: 14

Type: **not specified**

Using Julia to Accelerate Monte Carlo Event Generation with Neural Importance Sampling

Thursday 9 November 2023 09:45 (15 minutes)

Monte Carlo event generation is essential for analysis in high energy physics and fast implementations are required to keep up with the large amounts of data measured by experiments. Therefore, these methods need to reflect the theoretical predictions accurately to enable efficient data generation, e.g. by rejection sampling. However, traditional importance sampling algorithms, such as the commonly used VEGAS algorithm, often struggle with adapting targets with multiple or non-coordinate aligned features, as is common in high energy physics. Especially in strong-field QED, processes dynamically depend on field parameters, which means the use of established codes for these problems needs to be questioned. An importance sampling approach using neural networks applied to strong-field processes is presented within the framework QED.jl. The quality of the generated proposals, e.g. the unweighting efficiency, is compared to VEGAS, providing insights beneficial to applications beyond strong-field QED.

Author: JUNGNICHEL, Tom (CASUS / HZDR)

Co-authors: STEINIGER, Klaus (CASUS / HZDR); Dr BUSSMANN, Michael (CASUS / HZDR); Dr HERNANDEZ ACOSTA, Uwe (CASUS / HZDR)

Presenter: JUNGNICHEL, Tom (CASUS / HZDR)