

# Funnel: Exact maximum likelihood with dimensionality reduction

*Thursday, 12 May 2022 13:55 (25 minutes)*

Normalizing flows are exact likelihood models that have been useful in several applications in HEP. The use of these models is hampered by the dimension preserving nature of the transformations, which results in many parameters and makes the models unusable for some techniques. In this talk we introduce funnels, a new family of dimension reducing exact likelihood models.

Funnel models allow existing normalizing flows to be extended to dimension reducing transformations, and also to calculate the likelihood using existing non-invertible transformations such as convolutions. We can show that these models outperform standard flows on several downstream tasks, such as generation and anomaly detection, on standard image datasets.

We apply funnels to high energy physics datasets for generative modelling and demonstrate the advantages with respect to using standard flows or other generative models.

**Primary authors:** RAINE, Johnny (Universite de Geneve (CH)); KLEIN, Samuel Byrne (Universite de Geneve (CH)); Dr PINA-OTEY, Sebastian; Prof. VOLOSHYNOVSKIY, Slava (University of geneva); GOLLING, Tobias (Universite de Geneve (CH))

**Presenter:** KLEIN, Samuel Byrne (Universite de Geneve (CH))

**Session Classification:** Workshop