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Maximum likelihood using multidimensional hyperplane sections

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A more general version of the "plane section" algorithm from [Computer Physics Communications, 319:109913, Feb. 2026] is used to represent probability distributions for likelihood optimization. The algorithm from [Computer Physics Communications, 319:109913, Feb. 2026] was implemented in *python* using the *pytorch* library allowing gradients to be calculated with respect to the parameters of the representation. This in turn made it possible to perform maximum likelihood estimations using gradient methods, for example the *Adam* optimizer. Applications of the previous implementation were limited to two dimensions. The new version, described in the talk, can in principle be used with an arbitrarily large number of dimensions. This number is of course subjected to a limit determined by the available computing resources. The new algorithm is also much simpler conceptually opening the possibility of creating implementations in other programming languages. Additionally, the proposed algorithm might allow the analytical calculation of gradients for use in custom automatic differentiation functions. The implementation is tested using two and three dimensional distributions related to the problem of finding charged particle tracks in gas detectors of high energy physics experiments.

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