



Contribution ID: 18

Type: **Short talk**

## **Novel Methods for Cuts and Integrands applied to Six Loops in $\mathcal{N} = 4$ super-Yang-Mills**

*Wednesday, November 24, 2021 9:40 AM (20 minutes)*

We construct the complete (planar and non-planar) integrand for the six-loop four-point amplitude in maximal  $D \leq 10$  super-Yang-Mills. This construction employs new advances that combat the proliferation of loops and state-sums when evaluating multi-loop  $D$ -dimensional unitarity cuts. Concretely, we introduce two graph-based approaches, applicable in a range of theories, to evaluating generalized unitarity cuts in  $D$  dimensions: 1) recursively from lower-loop cuts, or 2) directly from known higher-loop planar cuts. Neither method relies on explicit state sums or any sewing of tree-level amplitudes. The first method meshes particularly well with the Method of Maximal Cuts to allow direct construction of the complete six-loop integrand.

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