Contribution ID: **43** Type: **not specified**

Worldline integration of photon amplitudes

Monday 15 April 2024 17:00 (30 minutes)

It has been known for many years that methods inspired by string theory, such as the worldline formalism, allow one to write down integral representations that combine large numbers of Feynman diagrams of different topologies. However, to make this fact useful for state-of-the-art calculations one has to confront non-standard integration problems where neither the known integration techniques for Feynman diagrams nor algebraic manipulation programs are of much help. Here I will give a progress report on this long-term project focusing on photon amplitudes at one and two loops, in vacuum and in external fields.

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Session Classification: Parallel A