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Summing Feynman diagrams in the worldline formalism

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The worldline formalism shares with string theory the property that it allows one to write down master integrals that effectively combine the contributions of many Faynman diagrams. While at the one-loop level these diagrams differ only by the position of the external legs along a fixed line or loop, at the multiloop level they generally involve different topologies. However, evaluating such master integrals analytically without decomposing them into the individual topologies leads to a difficult and non-standard mathematical challenge. Here, I will summarize recent progress with this problem based on a framework involving a reduction to quantum mechanics on the circle and the relation between inverse derivatives and Bernoulli polynomials.

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