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The art of computing loop integrals. (English) [Zbl 1122.81069](#)

Binder, Ilia (ed.) et al., Universality and renormalization. From stochastic evolution to renormalization of quantum fields. Proceedings of the workshops 'Percolation, SLE and related topics', September 20–24 2005 and 'Renormalization and universality in mathematical physics', October 18–22, 2005, Toronto, Canada. Providence, RI: American Mathematical Society (AMS); Toronto: The Fields Institute for Research in Mathematical Sciences (ISBN 0-8218-4273-0/hbk). Fields Institute Communications 50, 345-395 (2007).

Summary: A perturbative approach to quantum field theory involves the computation of loop integrals, as soon as one goes beyond the leading term in the perturbative expansion. First I review standard techniques for the computation of loop integrals. In a second part I discuss more advanced algorithms. For these algorithms algebraic methods play an important role. A special section is devoted to multiple polylogarithms. I tried to make these notes self-contained and accessible both to physicists and mathematicians.

For the entire collection see [\[Zbl 1108.81002\]](#).

MSC:

81T18 Feynman diagrams

16W30 Hopf algebras (associative rings and algebras) (MSC2000)

33C20 Generalized hypergeometric series, ${}_pF_q$

81Q30 Feynman integrals and graphs; applications of algebraic topology and algebraic geometry

Cited in **2** Documents