

**Connes, A.; Kreimer, D.**

**Insertion and elimination: The doubly infinite Lie algebra of Feynman graphs.** (English)

Zbl 1033.81061

Ann. Henri Poincaré 3, No. 3, 411-433 (2002).

The aim is to algebraically describe the operations of elimination and insertion of subgraphs in the context of Feynman graphs. This is exhibited by identifying such operations with representations of certain Hopf algebras and Lie algebra associated to Feynman graphs. The authors use their previous groundbreaking work regarding the Hopf algebras  $\mathcal{H}_{\text{cm}}$  and  $\mathcal{H}_{\text{rt}}$  introduced in [Commun. Math. Phys. 199, 203-242 (1998; Zbl 0932.16038)]. The insertions and eliminations do not commute, so the authors construct a larger Lie algebra which is studied in detail.

This work is important because the algebraic structures provided cover all operations in the perturbative expansion of a QFT.

Reviewer: [Antun Milas \(Tucson\)](#)

**MSC:**

[81T18](#) Feynman diagrams

[81T15](#) Perturbative methods of renormalization applied to problems in quantum field theory

[81T05](#) Axiomatic quantum field theory; operator algebras

[16W30](#) Hopf algebras (associative rings and algebras) (MSC2000)

[17B81](#) Applications of Lie (super)algebras to physics, etc.

[81Q30](#) Feynman integrals and graphs; applications of algebraic topology and algebraic geometry

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**Keywords:**

quantum field theory; Hopf algebras; Feynman graphs

**Full Text:** [DOI](#) [arXiv](#)