

# DEGENERATIONS OF (PRE)-LIE ALGEBRAS

DIETRICH BURDE

We will discuss degenerations, contractions and deformations of Lie algebras and pre-Lie algebras. While the Lie algebra case (and other cases, like Leibniz algebras, or associative algebras) has been studied, the case of pre-Lie algebras still needs to be investigated. This class of algebras shows up in quantum mechanics, i.e., in renormalization theory, and in geometry. Some results from the Lie case can be translated to the pre-Lie case. Among them are the results concerning the cohomology of Lie algebras. Here we need a cohomology theory for pre-Lie algebras. To obtain new semi-invariants for pre-Lie algebra degenerations, it is also interesting to consider generalized cocycles; for example generalized derivations, i.e., linear maps  $D: A \rightarrow A$  satisfying  $\alpha D(x \cdot y) = \beta D(x) \cdot y + \gamma x \cdot D(y)$  for all  $x, y \in A$  and fixed  $\alpha, \beta, \gamma \in K$ . Furthermore, there are new results for pre-Lie algebra degenerations which have no analogue in the Lie algebra case.

FAKULTÄT FÜR MATHEMATIK, UNIVERSITÄT WIEN, NORDBERGSTRASSE 15, 1090 WIEN, AUSTRIA  
*E-mail address:* `dietrich.burde@univie.ac.at`