

# Contents

Table of Contents	i
Acknowledgements	iii
Introduction	v
Chapter 1. Categories and monoidal structures	1
1.1. Categories and limits	1
1.2. Monoidal structures	9
1.2.1. Monoidal categories and monoidal functors	9
1.2.2. Lax monoidal categories	13
Chapter 2. Partial actions of groups	19
2.1. The classical definition of partial group actions	19
2.2. A categorical interpretation of partial actions	20
2.2.1. Lax and quasi partial actions	20
2.2.2. Partial actions and spans	21
Chapter 3. Hopf algebras and their partial (co)actions	31
3.1. Algebras and coalgebras	31
3.2. Bialgebras and Hopf algebras	34
3.3. Modules and comodules	38
3.4. Partial actions and coactions of Hopf algebras	42
3.5. Partial representations and partial modules	49
Chapter 4. Geometric partial comodules over a coalgebra	53
4.1. Geometrically partial comodules	53
4.2. Partial comodule morphisms	63
4.3. Coassociativity	66
4.4. Completeness and cocompleteness of the category of partial comodules	70
Chapter 5. Partial comodules over a Hopf algebra and Hopf-Galois theory	81
5.1. The lax monoidal category of geometric partial comodules over a bialgebra	81

5.2. Partial comodule algebras	88
5.2.1. Algebras in the category of partial comodules	89
5.2.2. Partial comodules in the category of algebras	91
5.3. Partial Hopf modules and partial Hopf-Galois theory	94
5.3.1. Partial Hopf modules	94
5.3.2. Hopf-Galois theory	96
Bibliography	109