

## **Part IV**

# **Mathematical Issues**

Some issues of mathematical interest arise in studies of the diverse models and equations encountered in loop quantum cosmology. These regard difference equations and their properties of specific interest for quantum space-time structures, as well as general techniques of deriving effective descriptions of quantum systems. The latter have contact with Poisson geometry and non-commutative algebra. From a physical point of view, such techniques are important for semiclassical approximations and the derivation of physical Hilbert-space properties.