# Contents

1 Introduction  
  1.1 Quantum Chromodynamics and strong interaction  
  1.2 Hadrons in nuclear matter  
  1.3 In-medium strangeness production  

2 Kaon production in nuclei:  
  Motivation for the experimental program at ANKE  
  2.1 Heavy ion collisions  
  2.2 Proton-induced kaon production  
  2.3 World data set on $K^+$ production in $pA$ interactions  

3 Measurements of $K^+$ production with ANKE  
  3.1 The ANKE spectrometer and $K^+$ detection  
    3.1.1 The ANKE spectrometer at COSY-Jülich  
    3.1.2 The detection system for $K^+$-mesons  
  3.2 Inclusive $K^+$ data for $pA$ reactions  
    3.2.1 Systematics of the World data set  
    3.2.2 The in-medium $K^+$ potential  
  3.3 $K^+$-production cross section in $pn$ interactions  
  3.4 Correlation measurements  
    3.4.1 Proton-nucleus collisions  
    3.4.2 The reaction $pp \rightarrow dK^+\bar{K}^0$  

4 Summary and outlook  

5 Attached papers  
  5.1 ANKE a new facility for medium energy hadron physics at COSY-Jülich  
  5.2 Identification of $K^+$-mesons from subthreshold $pA$ collisions with ANKE at COSY-Jülich  
  5.3 $K^+$-meson production in $pBe$ interactions at $T_p = 2.9$ GeV  
  5.4 Inclusive $K^+$-meson production in proton-nucleus interactions  
  5.5 Phenomenological analysis of $K^+$-meson production in proton-nucleus collisions  
  5.6 Forward $K^+$ production in subthreshold $pA$ collisions at 1.0 GeV  
  5.7 Evidence of kaon nuclear and Coulomb potential effects on soft $K^+$ production from nuclei  
  5.8 Observation of $K^+d$ correlations from $pA$ collisions  
  5.9 $a_0^+$-resonance production in $pp \rightarrow dK^+\bar{K}^0$ reactions close to threshold  

6 The ANKE collaboration