The Stochastic Cooling System and Its Application to Internal Experiments at the Cooler Synchrotron COSY, U. BECHSTEDT, J. DIETRICH, K. HENN, A. LEHRACH, R. MAIER, S. MARTIN, D. PRASUHN, A. SCHNASE, R. STASSEN, H. STOCKHORST, R. TÖLLE, KFA Jülich - The COSY stochastic cooling system operates in the frequency range from 1 to 3 GHz divided into two bands, 1 to 1.8 GHz and 1.8 to 3 Ghz. All components are installed and came into operation. Two pickup tanks each 4 m long for the horizontal and vertical plane are available. They are cryogenically cooled down to nearly 60 K to increase the signal-to-noise ratio especially at low proton numbers. Uncooled preamplifiers with a noise temperature below 50 K are mounted outside the vacuum tanks. The position of the electrode bars is independently adjustable. Programmable delays permit a momentum adjustment from 1.5 GeV/c to maximum momentum 3.3 GeV/c. Two kicker tanks of length 2 m are installed for the horizontal and vertical plane, respectively. Similar to the pickups the electrode bars are independently movable. In addition an adjustable notch filter is available for longitudinal cooling. We report on gain adjustments and computer-controlled BTF measurements to optimize the phase. Cooling in all phase space planes of a beam with up to 2e10 protons at about 2.6 GeV/c is discussed. The beam quality enhancement for an internal gas target experiment is presented.