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Spin manipulating 2.1 GeV/c polarized protons stored in COSY M.A. LEONOVA, A.D. KRISCH, V.S. MOROZOV, R.S. RAYMOND, D.W. SIVERS, V.K. WONG, University of Michigan, Ann Arbor, MI 48109-1120, R. GEBEL, A. LEHRACH, B. LORENTZ, R. MAIER, D. PRASUHN, A. SCHNASE, H. STOCKHORST, Forschungszentrum Juelich, IKP, D-52425 Juelich, D. EVER-SHEIM, F. HINTERBERGER, K. ULBRICH, Helmholtz Inst., Universitate Bonn, D-53115 Bonn — We studied spin flipping of a 2.1 GeV/c vertically polarized proton beam stored in COSY. We swept the frequency of a strong ferrite rf-dipole, with $\int Bdl = 0.46 \text{ T} \cdot \text{mm}$, through an rf-induced spin resonance to flip the beam's polarization direction. After determining the resonance's frequency, we varied the frequency ramp time Δt and frequency range Δf to maximize the spin-flip efficiency. At the rf-dipole's maximum strength and optimum Δf and Δt , we used the multiple spin flip technique to measure a spin-flip efficiency of $99.92 \pm 0.04\%$ [1]. Comparison of the theoretically predicted and experimentally measured rf-induced spin resonance strengths showed that experimentally it was about 10 times stronger than predicted. We then studied this discrepancy by varying the beam size and vertical betatron tune while measuring the strength of the rf-induced spin resonance. We observed a hyperbolic dependence on the distance from an intrinsic spin resonance and no significant dependence on the beam size. This research was supported by the German BMBF Ministry. [1] M.A. Leonova et al., Phys. Rev. Lett. 93, 224801 (2004).

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