

Multiple Partial Siberian Snakes in the AGS

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The BNL AGS accelerates polarized protons up to 25 GeV. In Run 6, the polarization at this energy improved from 55% to 65% by using a superconducting helical dipole (6%-15%) partial Siberian snake in addition to a (6%) normal conducting one (the percentages are the snake strengths). These two partial snakes were installed at locations separated from each other by 1/3 of the AGS ring to reduce the mismatching of the stable spin direction. However, the matching is not perfect unless the snake strengths are equal. So, the beam study was performed with both the snakes at 6% strength. With this setting, we observed 64.5% polarization in the AGS at maximum energy. We did not have enough time to optimize the beam polarization in this configuration, so it is likely that there is room for improvement.

A weak point of the 6%+6% snake scheme is the total strength of the snakes. Stronger snakes provide more margins in the spin tune gap for overcoming the vertical intrinsic resonances. Fortunately, a normal conducting solenoidal partial Siberian snake which had been used previously has been left in the AGS. If the solenoidal snake is moved to the location spaced 1/3 of the AGS ring apart from each of the other snakes, it can be used to cancel the spin mismatch. This presentation will show the calculated results of the spin mismatch and spin tune with the three partial snakes in the AGS.