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## Phase variation for snake matching in the EIC's HSR

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The Hadron Storage Ring of the Electron-Ion Collider will feature 6 Siberian snakes placed at the start of each arc to coherently cancel spin precession from diametrically opposite arcs in the ring. To avoid spin-orbital resonances, the alternating sum of the rotation axes of all snakes is 90 degrees, ensuring the closed-orbit spin tune is  $\frac{1}{2}$  and sufficiently far away from betatron tunes and integer tunes. This choice does not account for amplitude-dependent spin tune shift, which introduces high-order spin orbit resonances in the vicinity of strong first-order resonances. By varying betatron phase advances across each of the 6 arcs, we minimize the strength of first-order spin-orbit resonances as well as ADST shift. In the case of uncooled helium-3, we find it is necessary to minimally vary the vertical orbital tune as well but are able to completely avoid depolarization throughout the ramp with time-dependent phase advances.

### Footnotes

### Paper preparation format

LaTeX

### Region represented

America

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**Author:** HAMWI, Eiad (Cornell University (CLASSE))

**Co-authors:** HOFFSTAETTER, Georg (Cornell University (CLASSE)); HUANG, Haixin (Brookhaven National Laboratory)

**Presenter:** HAMWI, Eiad (Cornell University (CLASSE))

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