One of the possible arguments for the breaking of CP invariance is the existence of non-vanishing Electric Dipole Moments (EDM) of elementary particles. To SEARCH for the EDM of charged particles one can store them in a circular accelerator and observe the EDM effect on the beam polarization.

The necessary condition for the polarization build-up is a coherent spin motion. In this regard the peculiarities of so-called “frozen spin” storage rings with electrostatic and combined E+B bending fields have been considered. The first step to increase the Spin Coherence Time (SCT) is to turn on a radiofrequency cavity. The next step is to manipulate equilibrium energy levels associated with betatron orbit lengthening and nonlinear momentum compaction factor. This fact follows from the solution of nonlinear equations of LONGITUDINAL motion. It has been shown that the effective equilibrium energy is a universal scalar characteristic of the spin motion of a beam with a distribution in a 6D phase space. It needs to be the same for all particles in the beam to achieve a high SCT. Spin resonances act as another source of spin-decoherence. Their influence needs to be considered especially for the proton beam in the entire energy range of the machine.

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