

Investigation of lattice for deuteron EDM ring

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The quasi-frozen spin (QFS) concept of a storage ring for deuteron EDM measurement is based on the fact that the anomalous magnetic moment has a small negative value. Due to this fact, the rotation of spin in two parts of ring with the magnetic and electric fields relative to the momentum can compensate each other. In contrast to the concept of frozen spin we have the freedom to choose the ring parameters and also greatly simplified lattice. We consider two possible options for the lattice based on QFS concept and compare them with the frozen spin lattice where the elements with the combined electric and magnetic fields proposed by BNL are used. In the first QFS option, we use completely separate electric and magnetic parts that form a structure. In the second option, we suggest using only two magnetic arcs with two straight sections having the straight elements with magnetic and electric fields. The straight elements have a horizontal electric field of 120 kV/cm and a vertical magnetic field of 80 mT. They provide the compensation for the spin rotation in the arc and at the same time allow having straight electric plates without the higher orders field. This scheme could be tested in the COSY ring at FZ Juelich to prove the quasi-frozen spin concept.