

## Particle dynamics in an accelerator with a longitudinal magnetic field.

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The goal to research is to analyse of the influence of magnetic field perturbations on the dynamics of charged particles in a storage ring with a longitudinal magnetic field LEPTA.

The Low Energy Particle Toroidal Accumulator, created in the VP Dzhelepov Laboratory of Nuclear Problems, JINR (Dubna) is designed for generating a directed orthopositronium flux, which is formed as a result of recombination of positrons circulating in the LEPTA ring with a single-turn electron beam of the electron cooling system of the LEPTA.

To provide a long-term stability of the circulating positrons a helix quadrupole magnetic field is formed in one of the straight sections of the ring.

The report presents an optical transformation matrix for the LEPTA ring, obtained on the basis of the solution of the motion equation in WKB-approximation. The experimentally measured magnetic field contains the perturbation regions and the adiabatic decay regions of the magnetic field of the helix quadrupole. Accordance with the results of measurements, a matrix including these regions is constructed and contained in Full Transformation Matrix (FTM) of the LEPTA ring.

The code is built in Wolfram for this matrix made it possible to study the multi-rotational stability of particle motion in the LEPTA ring. The results are presented in the report.

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