

Birdcage resonator for a gradient spin flipper in strong magnetic fields

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This work is devoted to describing the design and parameters of a resonator for the future gradient spin flipper of a pulsed UCN source. Since this device must be installed strictly inside the warm zone of the superconducting magnet of the flipper, two geometric restrictions are imposed on it: a limitation on the outer radius, due to the heat-insulating casing of the superconducting magnet, and a limitation on the internal radius, this limitation is equal to the radius of the neutron guide. The rotating RF field B_1 must also satisfy certain conditions regarding the constant gradient field B_0 : the magnetic induction vector of the field B_1 must rotate in a plane perpendicular to field B_0 , the amplitude and rotation frequency of field B_1 must satisfy the flipper's adiabaticity conditions. After testing the birdcage coil type resonator, it was shown that this type of resonator is suitable both for all geometric conditions imposed by the neutron guide and the warm zone of the superconducting magnet, and for the necessary adiabaticity conditions for the rotating RF field B_1 . The result of the work done was the primary version of the 8-legged birdcage coil design, with a sufficient volume of RF field homogeneity, which can be used in the design of the gradient spin flipper for VCN deceleration.

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