MODERNIZATION OF THE SCATTERING CAMERA ON THE U-400 BEAM FOR PRECISION MEASUREMENTS OF HEAVY MULTICLUSTERS

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In experimental studies of multicluster parameters in nuclei, specific, rather stringent, requirements are imposed on the scattering chamber. First of all, this concerns the total angular resolution of the spectrometer of scattered particles, which consists of two components. The first component is the angular spread of the beam $\Delta\theta_k$, determined by the passive input collimator of the scattering chamber. It is regulated by the diameter of the input cutting diaphragm d_1, the diameter of the output diaphragm d_2 and the distance between them (the base of the input collimator) L. Then the angular resolution of the input collimator will be determined by the formula $\Delta\vartheta_k = 2\text{arctg}\frac{d_1+d_2}{2L}$.

The second component of the total angular resolution of the spectrometer is the geometric system «beam spot on the target (d_m) + input diaphragm of the particle detector (d_d)» and the distance between them (the base of the «target-detector» system) L_{md}. Especially note that it is the beam spot on the target that serves as the "input cutting diaphragm" for the imaginary (virtual) «collimator» of the particle detector. Then the angular resolution of the «target-detector» system will be determined by the formula $\Delta\vartheta_{md} = 2\text{arctg}\frac{d_m+d_d}{2L_{md}}$.

A very important parameter in the attempt to achieve the minimum angular resolution of the spectrometer $\Delta\vartheta_{sp}$ is the distance from the output cutting diaphragm of the input passive collimator to the nuclear target l. Note that this parameter, as a rule, is often overlooked by many researchers. The formula for calculating the beam spot on the target has the form $d_m = d_2 + (d_1 + d_2)\frac{l}{L}$.

With the first measurements of Wulf-Bragg diffraction on quasicrystalline nuclei in the zinc region, we apparently used such a stiff collimation of the beam and the entire geometry of the experiment.

It should be noted that in the planning of experiments with good angular resolution, the use of slotted, square, rectangular and other forms of collimators is absolutely unacceptable. In all these cases, the angular resolution of the spectrometer is completely determined by the diagonal sizes of all these geometric figures.