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(online) Superalloyed ^{10}C β -decay branching ratio measurement at INFN-LNL: report of Exp. 22. 72 and 24. 12

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We report preliminary results from the measurements of the superallowed ^{10}C β -decay branching ratio with the AGATA HPGe tracking array at INFN-LNL. The precedent experiment, Exp. 22. 72 was performed in June 2023. A 10-MeV proton beam accelerated from the Tandem-XTU impinged to a 1-mg/cm²-thick, Au-sandwiched ^{10}B target. The experiment was run in two modes: in-beam mode and decay mode. The in-beam mode employed a continuous beam, and the decay mode used a cycle of beam on-axis for 60 seconds and off-axis for 120 seconds using a beam steerer. The AGATA was employed to detect γ rays from ^{10}B following the β decay of ^{10}C , and γ rays from the inelastic scattering of ^{10}B , to determine the count and efficiency ratios of the 1022-keV and 718-keV γ rays in the ^{10}C β -decay. We also measured the lifetime of the ^{10}C with same dataset.

After the experiment, we improved our idea to make the setup capable of high-count rate, and performed the test experiment, Exp. 24. 12 last December. We employed a tantalum target ladder, a tantalum mask, and a ^{10}B target with carbon backing to suppress the background. The new logical signal-based trigger and the new trigger processing could increase the maximum count rate to 4 kHz in decay and in-beam modes. The new experiment was performed this July and according to the preliminary result, a statistical uncertainty less than the 0.2% level on the branching ratio is anticipated.

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