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A new measurement of the $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ branching ratio at the NA62 experiment

The $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ decay is a golden mode for flavour physics. Using data collected in 2016–2022, NA62 announced the first observation of this decay with a signal significance above 5σ and the measurement $B(K^+ \rightarrow \pi^+ \nu \bar{\nu}) = (13.0^{+3.3}_{-3.0}) \times 10^{-11}$. New results from the analysis of the 2023–2024 dataset are presented. This dataset doubles the effective sample size, leading to a 5σ expected sensitivity for the Standard Model process. Reconstruction and selection algorithms have been improved, boosting sensitivity and reducing the background contamination. An updated measurement of the branching ratio is presented and prospects for the full 2016–2026 dataset are discussed.

Primary authors: ROMANO, Angela (University of Warwick (GB)); OTHER, SPEAKER

Presenter: OTHER, SPEAKER

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