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## ORKA: The Golden Kaon Experiment. Precision measurement of $K^+ \rightarrow \pi^+ \nu \bar{\nu}$

The  $K^+ \rightarrow \pi^+ \nu \bar{\nu}$  decay is highly suppressed in the Standard Model (SM), while its rate can be predicted with minimal theoretical uncertainty.

Precision measurement of the branching ratio (BR) for this decay would be thus one of the most incisive probes

of quark flavor physics in the next years.

The primary sensitivity goal of the ORKA experiment is 1000 events at the SM level, and a measurement of the BR with 5% precision which is comparable to the uncertainty of the SM prediction based on foreseeable improvements of the errors from the CKM matrix elements.

Measuring  $K^+ \rightarrow \pi^+ \nu \bar{\nu}$  decay at the  $10^{-10}$  BR level represents a significant experimental challenge.

The weak signal signature of a  $\pi^+$  and nothing else requires high-performance systems for precision tracking, particle identification and photon vetoing.

In this talk we will discuss about detector and beam improvements needed to achieve an increased sensitivity of two order of magnitude with respects to BNL experiments and we will describe the ongoing intense detector *R&D* and simulation studies as well as opportunities for collaboration in the ORKA team.

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**Track Classification:** Experiments: 2a) Experiments & Upgrades