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Latest results and precision measurements with NA62

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The NA62 experiment at CERN collected the world's largest data set of charged kaon decays in 2016-2018, leading to the first measurement of the Branching Fraction of the ultra-rare $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ decay. The $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ decay was observed with a significance of 3.4σ , based on 20 candidate events. This measurement also sets limits on $\text{BR}(K^+ \rightarrow \pi^+ X)$, where X is a scalar or pseudo scalar particle. The analysis of the 2018 data sample and the future NA62 plans and prospects are reviewed.

The flavour-changing neutral current decay $K^+ \rightarrow \pi^+ \mu^+ \mu^-$ is induced at the one-loop level in the Standard Model. Preliminary results from an analysis of the $K^+ \rightarrow \pi^+ \mu^+ \mu^-$ decay are reported. The most precise determination of the $K^+ \rightarrow \pi^+ \mu^+ \mu^-$ form-factor parameters a_+ and b_+ made by NA62 using data collected in 2017 and 2018 is described.

In addition to the precision SM measurement, NA62 employs dedicated trigger lines to collect dilepton final states, which can be used to search for lepton flavor and lepton number violating kaon decays. The stringent upper limits on the rates of several K^+ decays violating lepton flavour and lepton number conservation, obtained with the NA62 data set, are presented.

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