Heavy neutral lepton searches at NA62

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Neutrino Minimal Standard Model:
- SM extension accounting for baryon asymmetry of the universe (BAU), dark matter (DM), neutrino masses and oscillations
- 3 additional right-handed, singlet, Majorana HNLs (not observed yet)

NA62 at CERN SPS:
- Fixed-target experiment to produce kaons and measure $B(K^+ \rightarrow \pi^+ \nu \bar{\nu})$ with 20% precision
- Data taking (2015-2018)
- Possibility to run beyond 2021
- Minimum bias run (2015) to search for HNL production in $K^+ \rightarrow \ell^+N$ decays

\[
B(K^+ \rightarrow \ell^+N) = B(K^+ \rightarrow \ell^+\nu) \cdot \rho_{\ell}(m_N) \cdot |U_{\ell4}|^2
\]
Technique and results

- Event selection:
  - One positive track in time with kaon
  - $e, \mu$ identified through energy-momentum ratio
- No HNL signal observed
- UL established on $B(K^+ \rightarrow 1^+N)$ and $|U^2_{e,\mu}|$
- Results improve world existing limits on HNL production searches on $|U^2_e|$ (over whole mass range) and on $|U^2_{\mu}|$ (for masses above 300 MeV/$c^2$)
- Opportunity to further improve with 2016-2018 data sample