New Physics Searches at NA62 Experiment

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on behalf of NA62 Collaboration

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Outline

The NA62 Experiment

Kaon Decay mode *vs* **Beam-Dump mode**

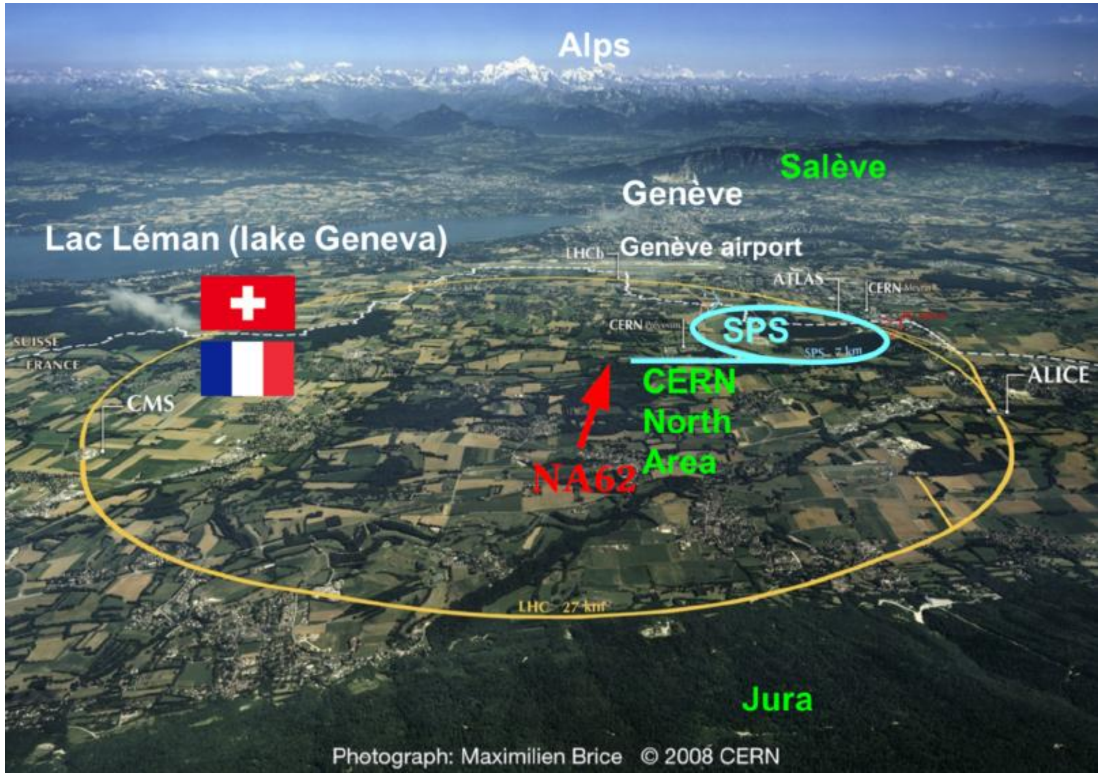
NA62 Results for ultra rare SM allowed $K^+ \to \pi^+ \nu \bar{\nu}$

NA62 Searches for $K^+ \longrightarrow \pi^+ X$

NA62 Searches for $\pi^+ \longrightarrow e^+ N$, and $\pi^0 \longrightarrow invisibles\ outside\ SM$

NA62 Results for Searches of Exotic Messanger Signals with ℓℓ final states (published in 2023 & 24) and with hh and γγ final states (published in 2024 & 25)

The NA62 Experiment at CERN



~ 30 institutes, ~ 300 collaborators

K^+ decays in flight OR Beam Dumped: TAX closed & target removed

Data taking **Run 1** 2017-18 **Run 2** 2021-26

2016 Comissioning + Physics run (45 days)

2017, 2018 Run 1 data taking (160+217 days)

2021 Physics run (85 days, 10 days in BD mode)

2022 Physics run (215 days)

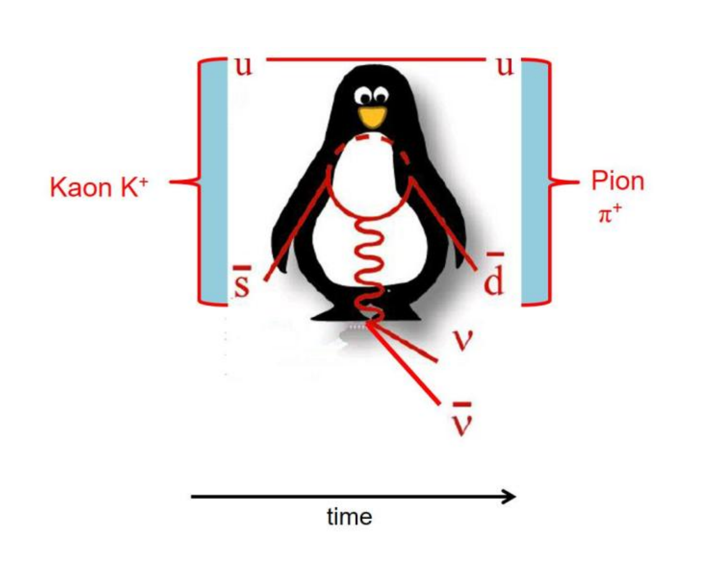
2023 Physics run (150 days, 10 days in BD mode)

2024 Physics run (204 days, 12 days in BD mode)

2025 Physics run (210 days foreseen, started 04/2025)

Continues long history of Kaon Physics at CERN

Primary goal: measure $\mathcal{B}(K^+ \to \pi^+ \nu\bar{\nu})$



Theory: extra clean, ~ 10% uncertainty

very rare, SM value $8.60 \pm 0.42\ 10^{-11}$

Experiment: NA62 new result JHEP 02 (2025) 191

$$\mathcal{B}_{2016-2022}(K^+ \to \pi^+ \nu\bar{\nu}) = (13.0^{+3.0}_{-2.7}|_{stat}\,{}^{+1.3}_{-1.3}|_{syst}) \times 10^{-11}$$

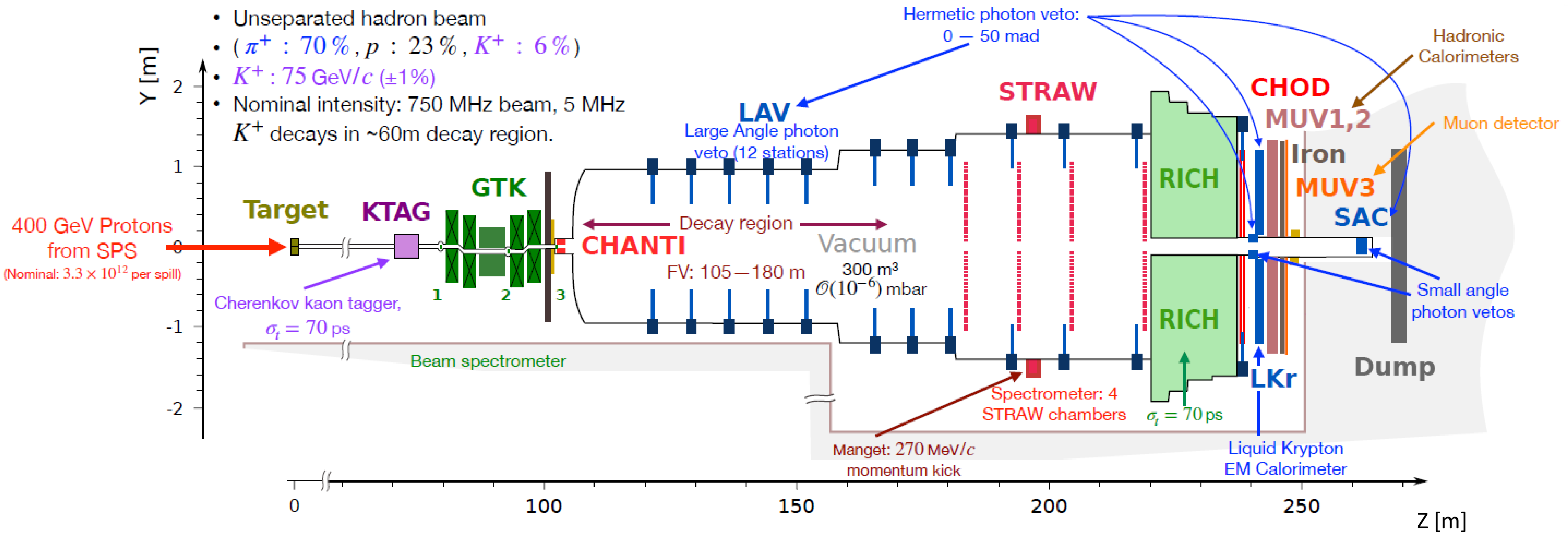
51 events observed

NA62 Beamline & Detector

400 GeV/c primary p^+ beam impinges Be target, 10^{12} protons/s on spill
75 GeV/c secondaries ($\sim 6\%$ K^+) selected using magnetic achromat, TAX collimators
5 MHz K^+ decay-in-flight in 60 m long fiducial volume

NA62 setup in K mode: studies of rare K^+ decays

- Unseparated hadron beam
- (π^+ : 70 %, p : 23 %, K^+ : 6 %)
- K^+ : 75 GeV/c (±1%)
- Nominal intensity: 750 MHz beam, 5 MHz K^+ decays in ~60m decay region.



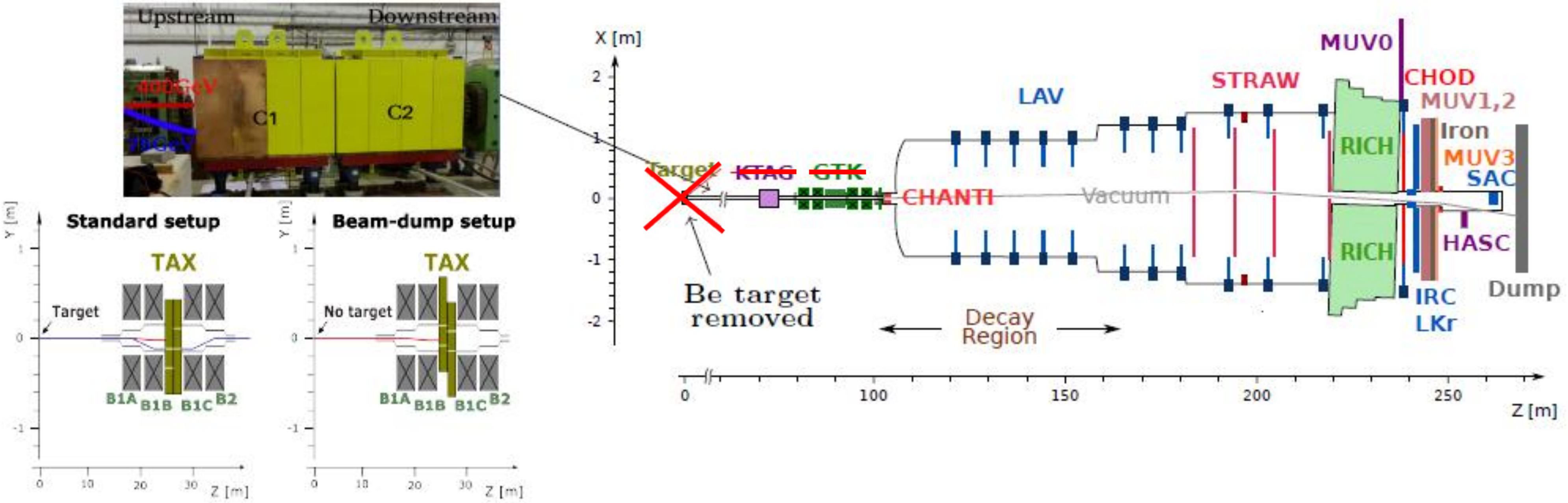
JINST 12 (2017) P05025

Particle Tracking: upstream: GTK = silicon pixel tracker, decay region: STRAW = tracking momentum spectrometer
P. Identification : upstream: KTAG, downstream: RICH= π/μ/e ID Cherenkov, LKr, MUV1,2 calorimetry
Veto: CHANTI = inelastic collision Anticounter, LAV, IRC, SAC = Large & Small Angle photon vetos

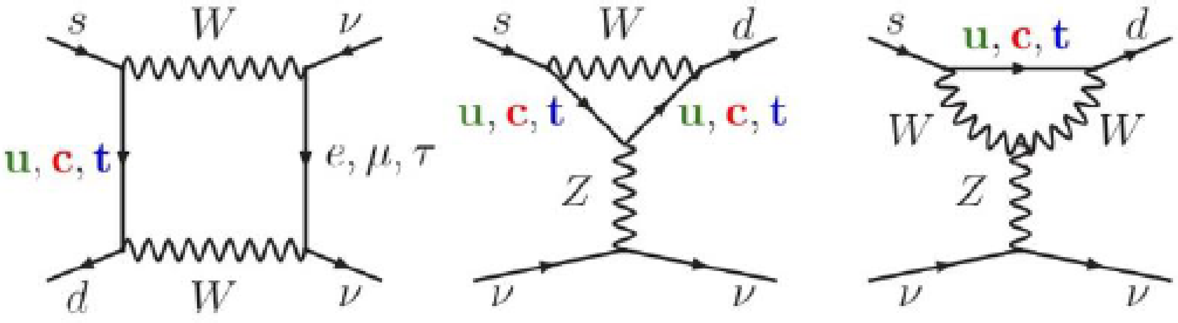
Overall experimental time resolution reaches $\mathcal{O}(100)$ps

NA62 setup in Beam-Dump (BD) mode: searches for dark messenger signals

Target removed and TAX closed
KTAG and GTK not used



$K^+ \to \pi^+ \nu\bar{\nu}$ Theory



- FCNC $s \to d$, highly suppressed
- Theoretically clean, dominated by short distance
- Hadronic form factor extracted from $K^+ \to \pi^0 \ell^+ \nu$
- Choice of CKM parameters affects the SM predictions
- $K \to \pi\nu\bar{\nu}$ constrain the unitarity triangle
- Highly sensitive to new physics

BR×10^{11}	$K^+ \to \pi^+ \nu\bar{\nu}$
D'Ambrosio et al. [JHEP 09 (2022) 148]	7.86 ± 0.61
Buras et al. [EPJC 82 (2022) 615]	8.60 ± 0.42
Experimental status	$10.6\,^{+4.0}_{-3.4}\big\|_{stat} \pm 0.9_{syst}$ NA62 2016–2018 [JHEP 06 (2021) 093]

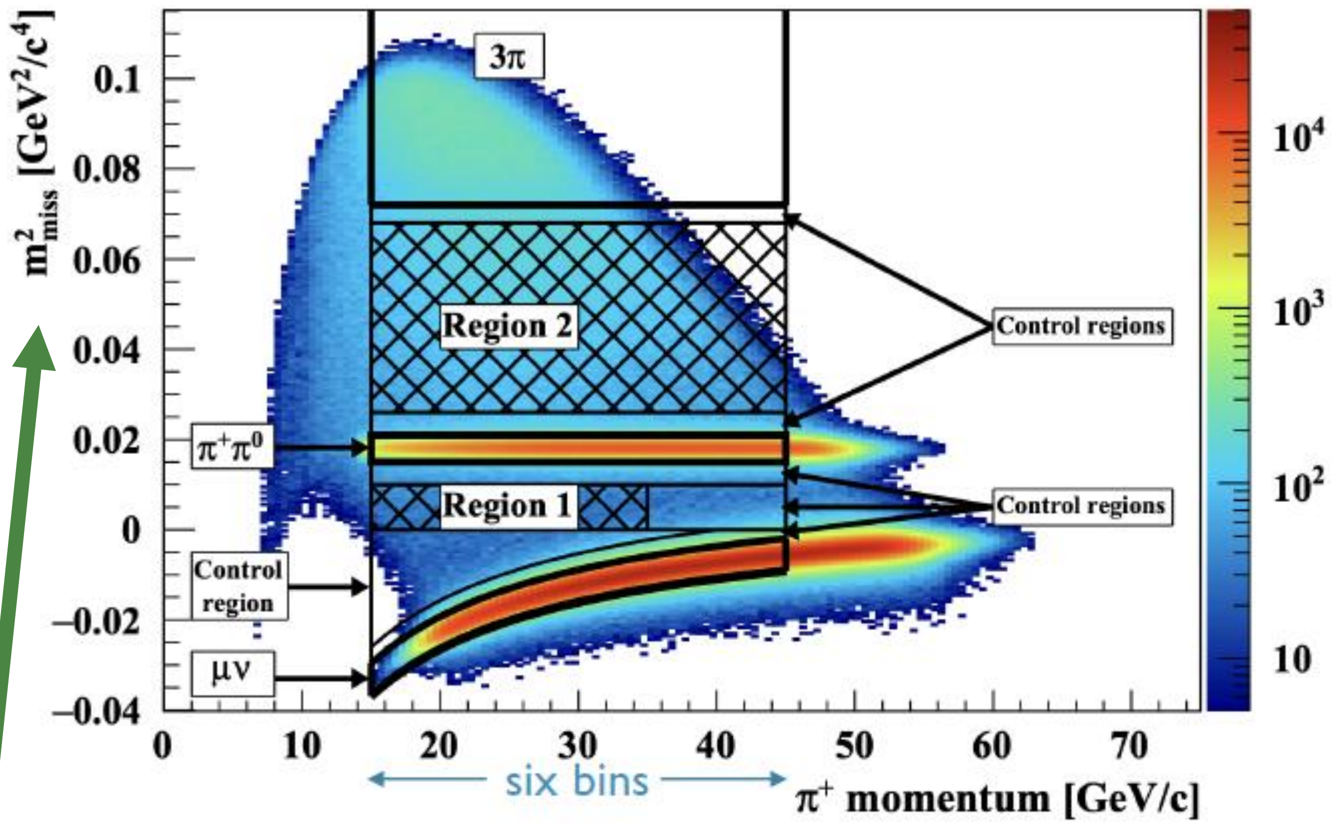
Experiment: How to search for ultra-rare K decays

Main K^+ (bkg) decay modes:

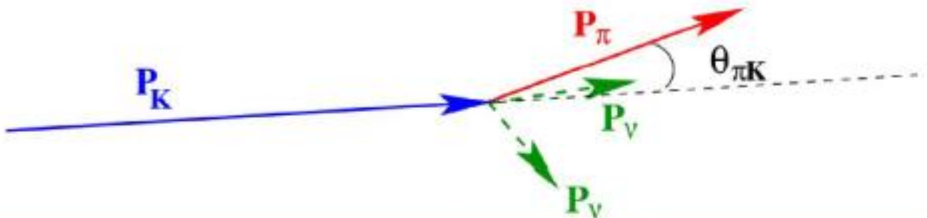
$K^+ \rightarrow \mu^+\nu$	64×10^{-2}
$K^+ \rightarrow \pi^+\pi^0$	21×10^{-2}
$K^+ \rightarrow \pi^+\pi^+\pi^-$	5.6×10^{-2}
$K^+ \rightarrow \pi^+\pi^-e^+\nu$	4.3×10^{-5}

Keystones

- $O(10^4)$ bkg suppression from kinematics
- $> 10^7$ muon rejection
- $> 10^7$ π^0 rejection
- $O(100\ \text{ps})$ timing between sub-detectors



$$m^2_{miss} = (P_K - P_\pi)^2$$



Signal Sensitivity: 2021-22 improvements vs. 2018

$$N^{exp}_{\pi\nu\bar{\nu}}(p_i) = \frac{\mathcal{B}^{SM}_{\pi\nu\bar{\nu}}}{\mathcal{B}_{SES}(p_i)} = \frac{\mathcal{B}^{SM}_{\pi\nu\bar{\nu}}}{\mathcal{B}_{\pi\pi}} \boxed{\frac{A_{\pi\nu\bar{\nu}}(p_i)}{A_{\pi\pi}(p_i)}} D_0 N_{\pi\pi}(p_i)\varepsilon_{trig}(p_i)\varepsilon_{RV}$$

Acceptance:

Case	OLD 2018 (S2)	NEW 2021-22	
Norm.	11.8%	13.4%	**+15%**
Signal	(6.37±0.64)%	(7.62±0.22)%	**+20%**

- Increased selection efficiencies.
  - New K-pi matching technique.
  - Re-tuned vertex conditions.
  - Relaxation of some vetos.
- Improved precision (plus improved systematic uncertainty evaluation)

Single Event Sensitivity and Signal Expectation

Effective kaon decays

$$N_K = \frac{N_{\pi\pi} D}{BR(\pi\pi) A_{\pi\pi}} = (2.85 \pm 0.01) \times 10^{12}$$

Single Event Sensitivity

$$SES = \frac{BR(\pi\nu\nu)}{N^{exp}_{\pi\nu\nu}} = (8.48 \pm 0.29) \times 10^{-12}$$

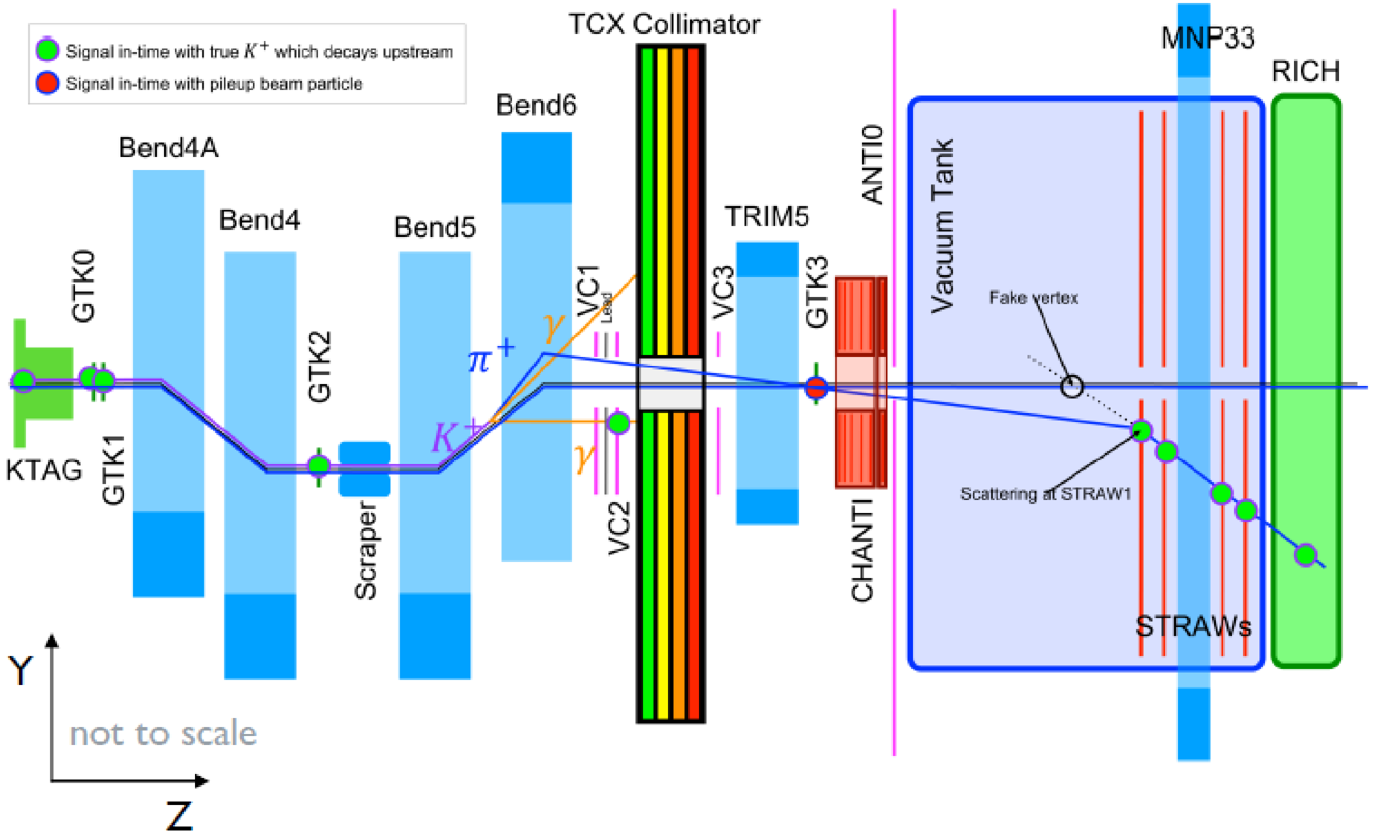
2016 – 2018: $(8.39 \pm 0.54) \times 10^{-12}$

$$N^{exp}_{\pi\nu\nu} = 9.91 \pm 0.34$$

2016 – 2018: 10.01 ± 0.42

Background

UPSTREAM BACKGROUND



N(Upstream) = $7.4^{+2.1}_{-1.8}$

Suppression

- Δt between K^+ and π^+ reconstructed tracks
- Upstream vetoes (VC, CHANTI, ANTI0)
- BDT using spatial infos of K^+, π^+

Estimation

- Fully data-driven
- "Upstream Reference Sample" contains all known generation mechanisms
- Bkg-to-signal probability from data

Validation

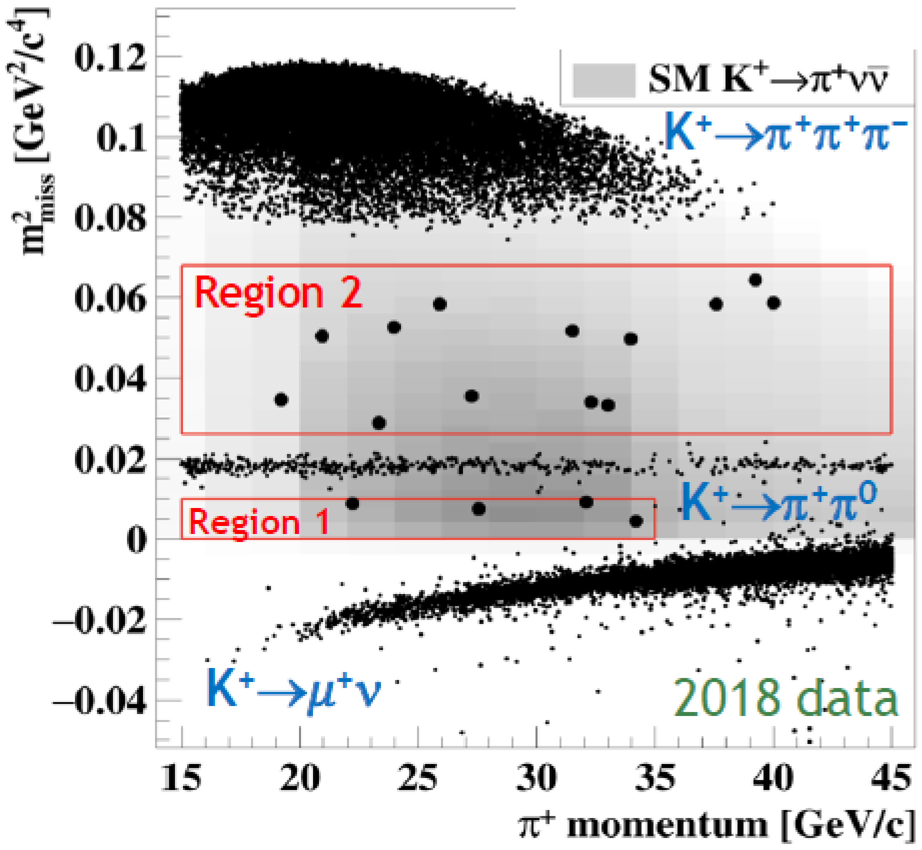
- 10 independent samples enriched with different mechanisms

Summary for Expected Background

Background	Events
$K^+ \to \pi^+\pi^0(\gamma)$	0.83 ± 0.05
$K^+ \to \mu^+\nu(\gamma)$	1.70 ± 0.47
$K^+ \to \pi^+\pi^+\pi^-$	0.11 ± 0.03
$K^+ \to \pi^+\pi^- e^+\nu$	$0.89^{+0.33}_{-0.27}$
$K^+ \to \pi^+\gamma\gamma$	0.01 ± 0.01
$K^+ \to \pi^0\ell^+\nu$	< 0.001
Upstream	$7.4^{+2.1}_{-1.8}$
Total	$11.0^{+2.1}_{-1.9}$

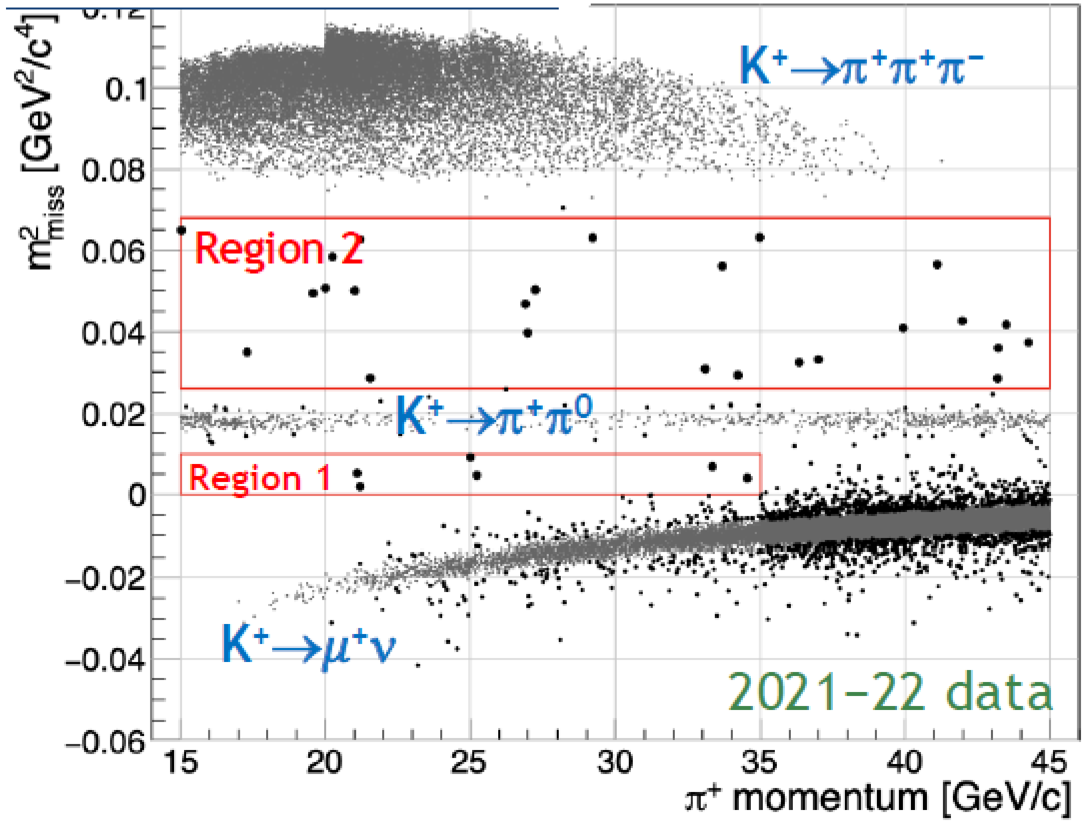
$K^+ \rightarrow \pi^+ \nu \bar{\nu}$ Results (2016 – 2022 data)

2016 – 2018 data



20 events in the Signal Regions

2021 – 2022 data



31 events in the Signal Regions

$K^+ \to \pi^+ \nu \bar{\nu}$ Results (2016 – 2022 data)

51 signal candidates, expected background: $\mathbf{18^{+3}_{-2}}$

$$\mathcal{B}(K^+ \to \pi^+ \nu \bar{\nu}) = \left(13.0^{+3.0}_{-2.7}\Big|_{\rm stat}{}^{+1.3}_{-1.3}\Big|_{\rm syst}\right) \times 10^{-11} = \left(13.0^{+3.3}_{-3.0}\right) \times 10^{-11}$$

JHEP 02 (2025) 191

The rarest particle decay observed ever at 5σ significance

Consistent with the SM expectation at 1.7σ

Search for $K^+ \to \pi^+ X$ PBC benchmark cases

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH (CERN)

CERN-PBC-REPORT-2018-007

arXiv:1901.09966v2 [hep-ex] 2 Mar 2019

Physics Beyond Colliders at CERN
Beyond the Standard Model Working Group Report

J. Beacham[1], C. Burrage[2,*], D. Curtin[3], A. De Roeck[4], J. Evans[5], J. L. Feng[6], C. Gatto[7], S. Gninenko[8], A. Hartin[9], I. Irastorza[10], J. Jaeckel[11], K. Jungmann[12,*], K. Kirch[13,*], F. Kling[6], S. Knapen[14], M. Lamont[4], G. Lanfranchi[4,15,*,**], C. Lazzeroni[16], A. Lindner[17], F. Martinez-Vidal[18], M. Moulson[15], N. Neri[19], M. Papucci[4,20], I. Pedraza[21], K. Petridis[22], M. Pospelov[23,*], A. Rozanov[24,*], G. Ruoso[25,*], P. Schuster[26], Y. Semertzidis[27], T. Spadaro[15], C. Vallée[24], and G. Wilkinson[28].

Abstract: The Physics Beyond Colliders initiative is an exploratory study aimed at exploiting the full scientific potential of the CERN's accelerator complex and scientific infrastructures through projects complementary to the LHC and other possible future colliders. These projects will target fundamental physics questions in modern particle physics. This document presents the status of the proposals presented in the framework of the Beyond Standard Model physics working group, and explore their physics reach and the impact that CERN could have in the next 10-20 years on the international landscape.

* PBC-BSM Coordinators and Editors of this Report
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~12 Benchmark Cases (BC) proposed for searches

Search for $K^+ \rightarrow \pi^+ X$ PBC benchmark cases

CERN PBC working group Benchmark Cases

NP particle	Type	SM portal	PBC	Decay channels
dark photon (A'_μ)	vector	$-(\epsilon/2 \cos\theta_W) F'_{\mu\nu} B^{\mu\nu}$	BC1-2	$\ell\ell$, 2π, 3π, 4π, $2K$, $2K\pi$
Dark Higgs (S)	scalar	$(\mu S + \lambda S^2) H^\dagger H$	BC4-5	$\ell\ell$, 2π, 4π, $2K$
axion/ALP (a)	pseudoscalar	$(C_{VV}/\Lambda) a V_{\mu\nu} \tilde{V}^{\mu\nu}$ $(C_{ff}/\Lambda) \partial_\mu a \bar{f} \gamma^\mu \gamma^5 f$	BC9,11 BC10	$\gamma\gamma$, $\ell\ell$, $2\pi\gamma$, 3π, 4π, $2\pi\eta$, $2K\pi$

Two types of direct searches for NP particles at fixed-target experiments:

(i) NP particle production in SM particle decays – reconstruction from both initial and final state particles

(ii) NP particle decay to SM particles – reconstruction of original particle from the SM final states

NA62 Experiment can do both in two modes of operation: **(i)** kaon mode and **(ii)** beam-dump mode

NA62 in Beam-Dump mode: $\ell\ell$, $\gamma\gamma$ and hadronic (2 charged tracks) final states

Search for $K^+ \to \pi^+ X$ at NA62

JHEP 02 (2021) 201; arXiv 2507.17286

Peak search in the two $K^+ \to \pi^+ \nu\nu$ regions 0 – 110 MeV and 154 – 260 MeV

Main background: $K^+ \to \pi^+ \nu\nu$

Limits on $BR(K^+ \to \pi^+X)$ of order $O(10^{-11})$

Related search $\boldsymbol{\pi^0 \to}$ **invisible**

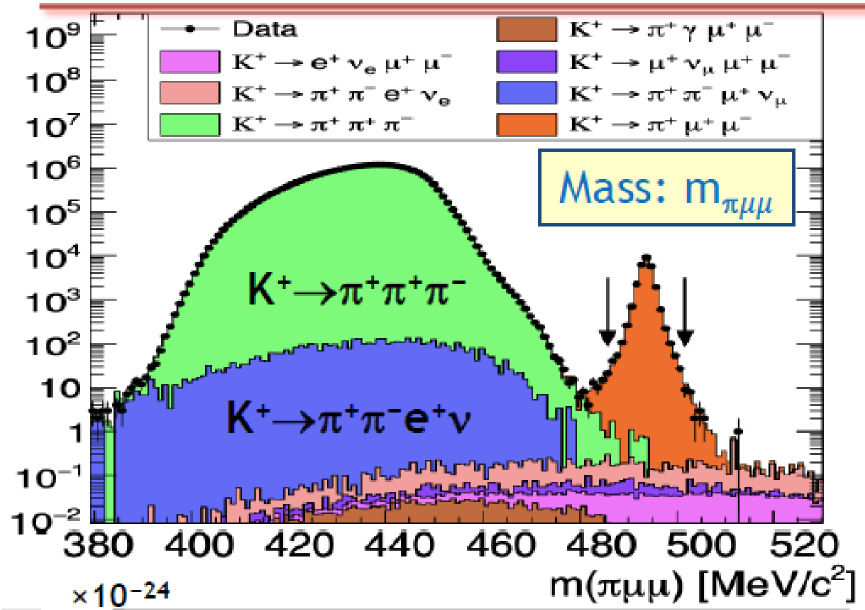
Main SM background: negligible $\pi^0 \to 4\nu$

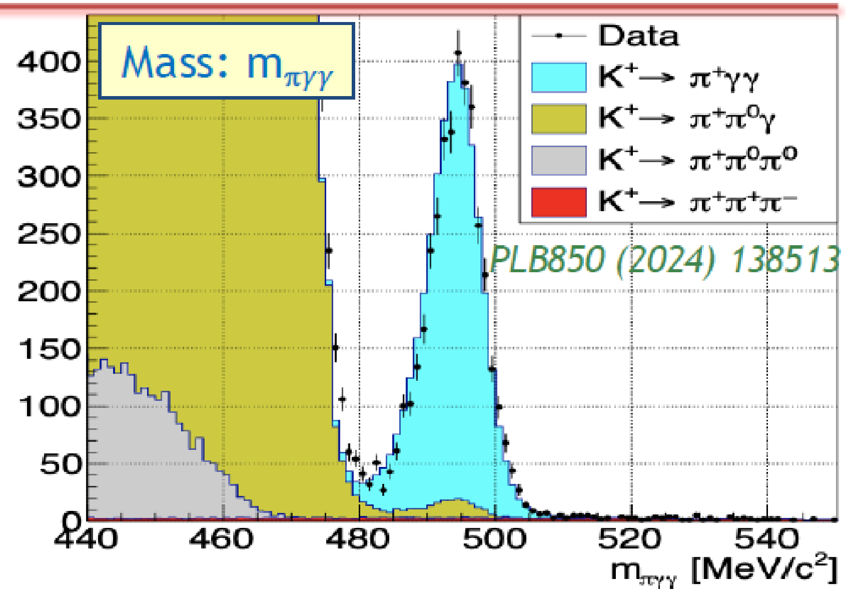
Limits on $BR(K^+ \to \pi^+X)$ of order $O(10^{-11})$

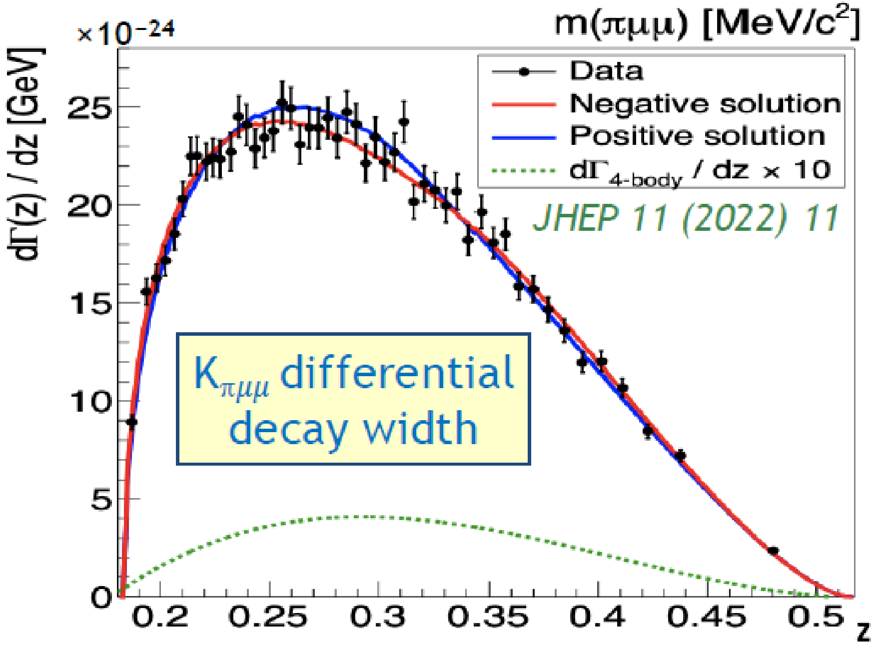
- ✓ Interpretation as $K^+ \to \pi^+ X$, with m_X between R1 and R2.
- ✓ Using 10% of Run 1 dataset; 4×10^9 tagged π^0 mesons.
- ✓ Optimised π^+ momentum range to reduce $\pi^0 \to \gamma\gamma$ background.
- ✓ Expected $\pi^0 \to \gamma\gamma$ events: 10^{+22}_{-8}, events observed: 12.

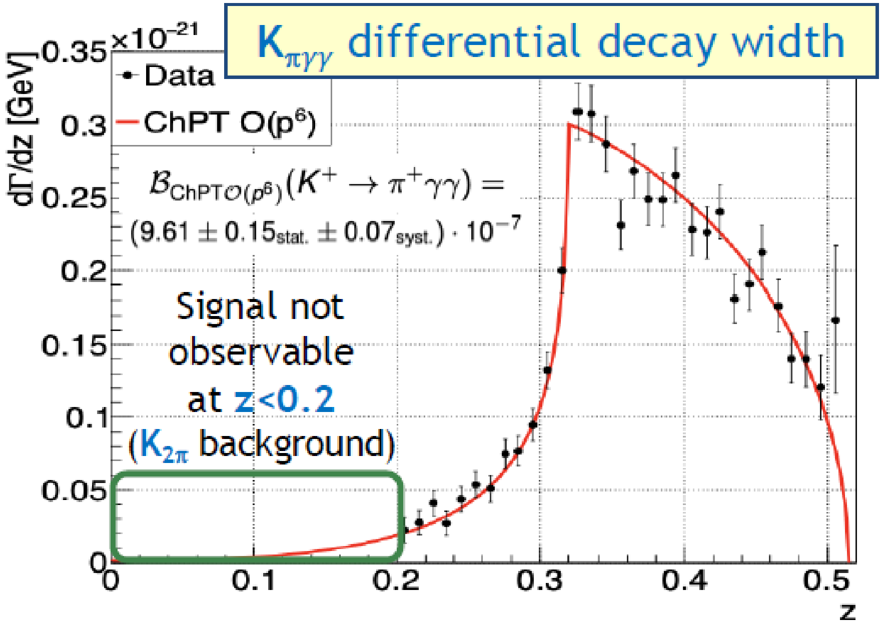
$\boxed{BR(\pi^0 \to inv) < 4.4 \times 10^{-9} \text{ at } 90\% \text{ CL}}$

Peak searches in $K^+ \to \pi^+\mu^+\mu^-$ and in $K^+ \to \pi^+\gamma\gamma$



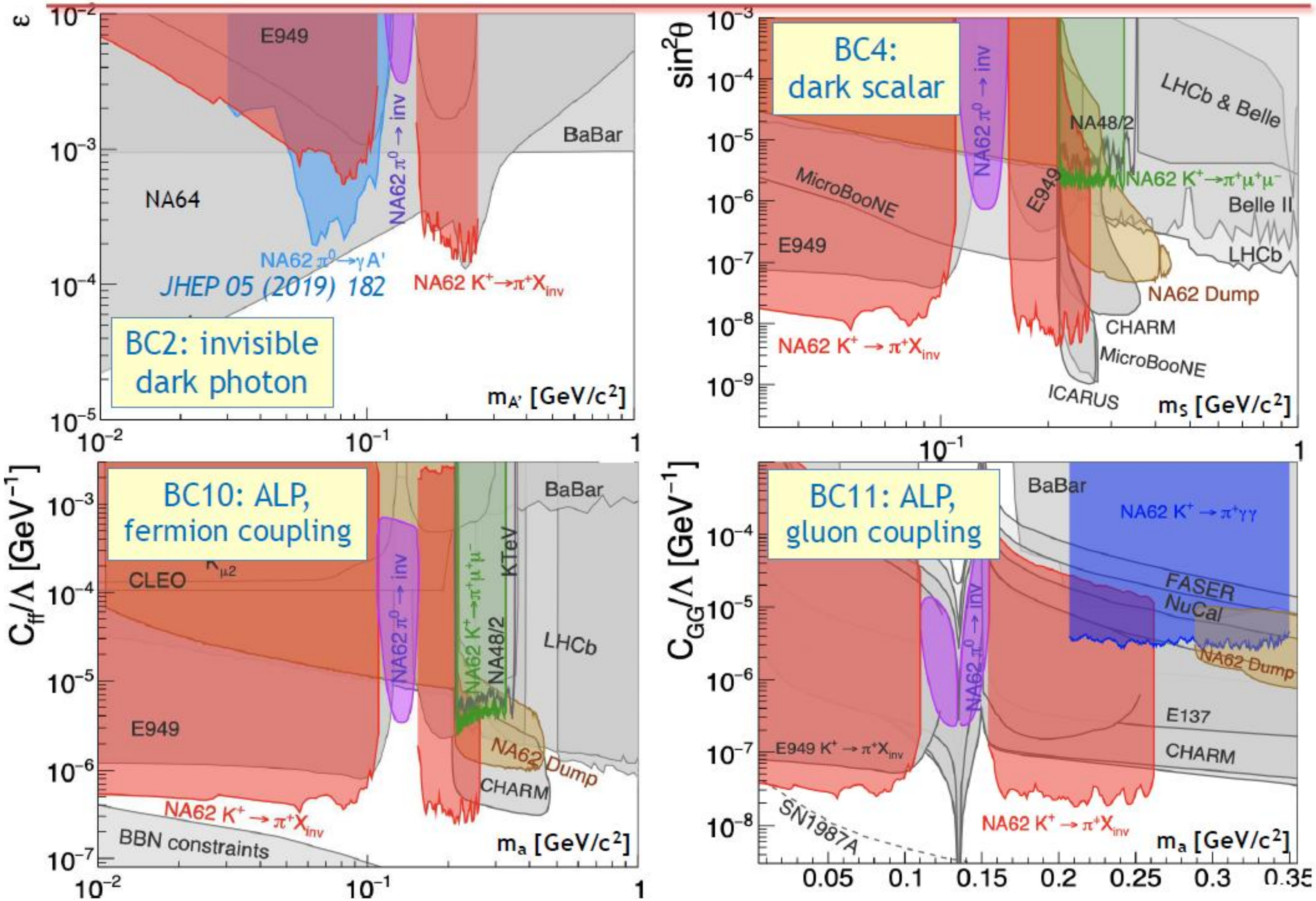






Search Summary for $K^+ \to \pi^+ X$

arXiv 2507.17286



nvisible X, from the $K^+ \to \pi^+ \nu\nu$ measurement *[JHEP 02 (2025) 191]*

- BC2 (invisible dark photon),
- BC4 (dark scalar);
- BC10 (ALP with fermion coupling);
- BC11 (ALP with gluon coupling).

Visible X, from $K^+ \to \pi^+ \mu^+ \mu^-$ and $K^+ \to \pi^+ \gamma\gamma$ measurements *[JHEP 11 (2022) 11; PLB850 (2024) 138513]*

NA62 Dark Messenger Beam Dump searches – Monte Carlo

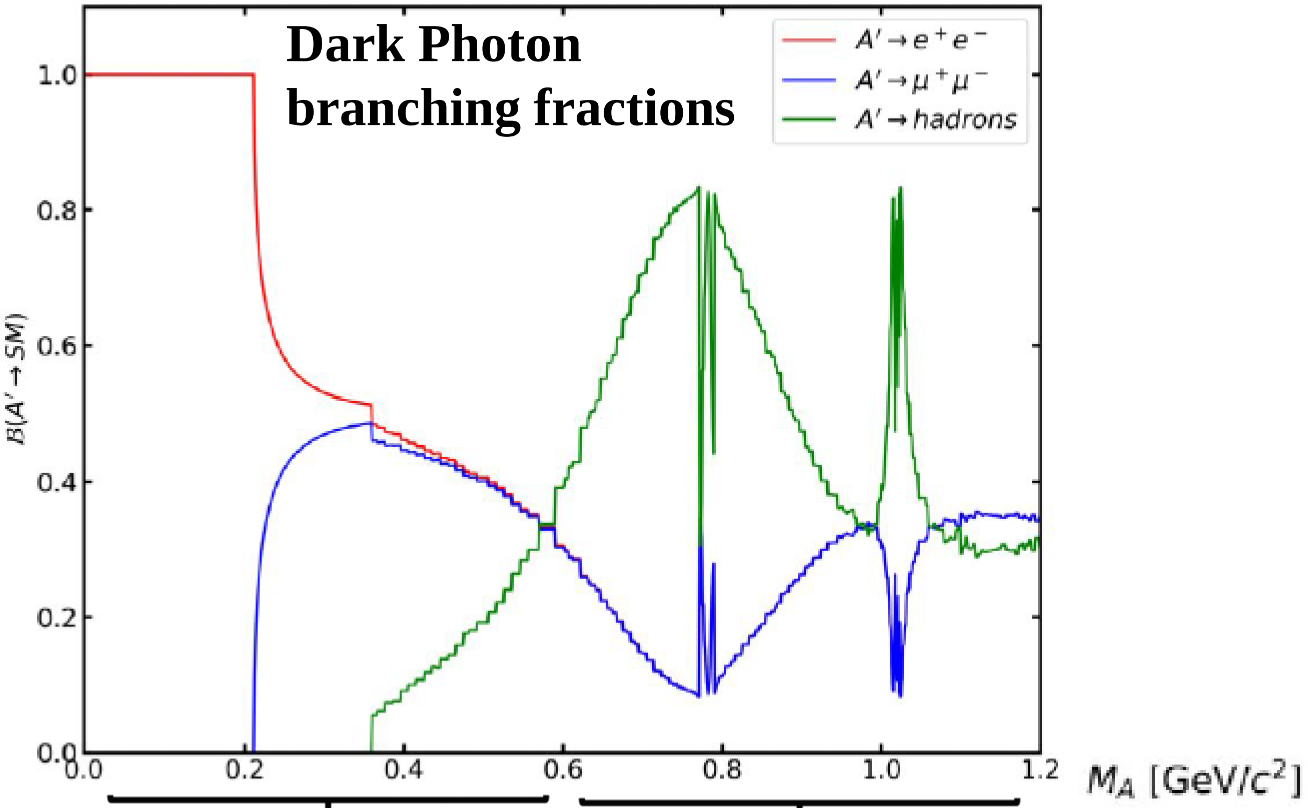
Numerous decay channels and production mechanism have been simulated:

DP Bremsstrahlung $\ell\ell$

Meson mediated

model	production channels	decay channels
DP	Bremsstrahlung	$\pi^+\pi^-$
		$\pi^+\pi^-\pi^0$
		$\pi^+\pi^-\pi^0\pi^0$
		K^+K^-
		$K^+K^-\pi^0$
	light meson decay	$\pi^+\pi^-$
		$\pi^+\pi^-\pi^0$
		$\pi^+\pi^-\pi^0\pi^0$
DS	B meson decay	$\pi^+\pi^-$
		$\pi^+\pi^-\pi^0\pi^0$
		K^+K^-
ALP	Primakoff mixing $(\pi^0/\eta/\eta')$ B meson decay	$\pi^+\pi^-\gamma$
		$\pi^+\pi^-\pi^0$
		$\pi^+\pi^-\pi^0\pi^0$
		$\pi^+\pi^-\eta$
		$K^+K^-\pi^0$

36 combinations of production and decay channels studied for hadronic analysis only



Leptonic Decays Hadronic Decays

dominate

NA62 Dark Messenger Beam Dump searches – Background Determination

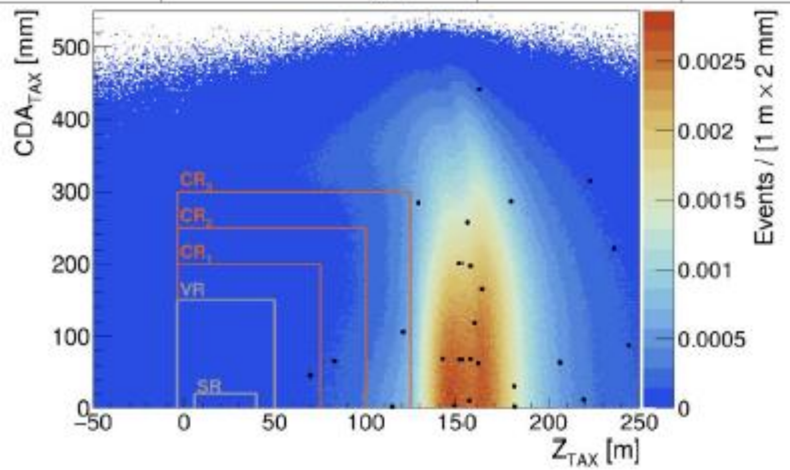
- **Combinatorial and neutrino-induced backgrounds**: negligible contributions in h^+h^- or e^+e^- , dominant for $\mu^+\mu^-$ (halo muons)
- **Prompt background**: inelastic interaction of halo muons can produce hadrons or e^+e^-
- **Upstream background**: formed by particles that are collected by the GTK achromat

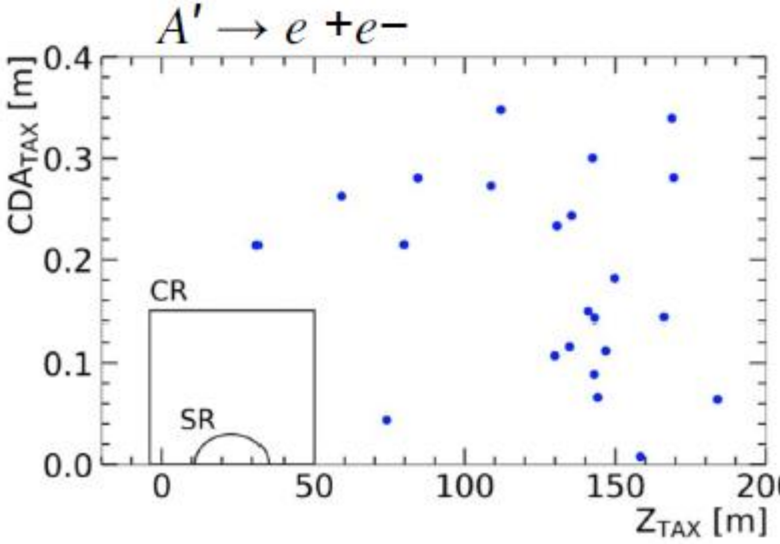
Background determination for A’→ℓℓ

- **Combinatorial and neutrino-induced backgrounds**
- **Prompt background**
- **Upstream background**

	Combinatorial	Prompt @ 90% CL	Upstream prompt@ 90% CL
N bkg SR	**0.016 ± 0.002**	<0.0004	< 0.007

$Nbkg \quad SR$ = 0.0094−0.009 + 0.049 @ 90% CL





NA62 Dark Messenger Beam Dump searches
Results for leptonic final states

NA62 Collaboration, *Search for leptonic decays of dark photons at NA62,*
Phys. Rev. Lett ***133*** *(2024) 111802.*

NA62 Collaboration, *Search for dark photon decays to μ+ μ- at NA62,*
JHEP ***09*** *(2023) 035.*

NA62 Collaboration, *Search for hadronic decays of feebly-interacting particles at NA62,*
Eur. Phys. J ***C*** *(2025) 85:571.*

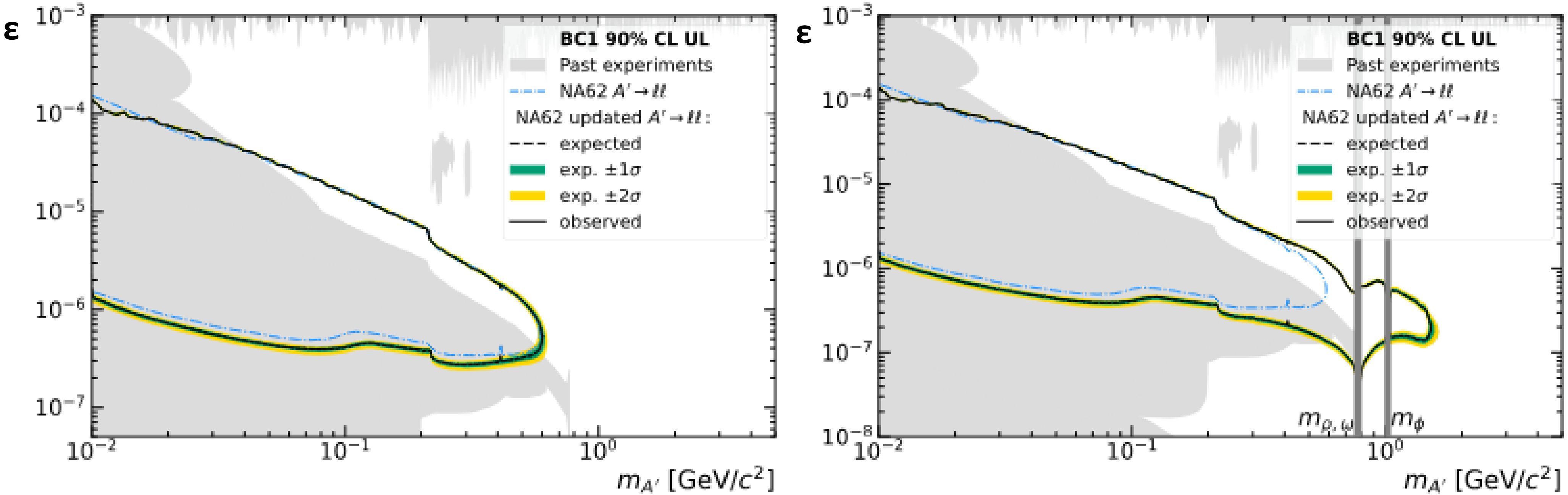


Fig. 10 The observed 90% CL exclusion contours in the plane ($m_{A'}$, ε) in *BC1* benchmark case for di-lepton final states together with the expected $\pm 1\sigma$ and $\pm 2\sigma$ bands (theory uncertainty not included) with updated light meson spectra only (left) and with mixing production and time-like form factor for bremsstrahlung production (right). The exclusion contour obtained in [4] is displayed as a dash-dotted blue line

Combined
$\mu^+\mu^-$ and e^+e^-
Results

NA62 Dark Messenger Beam Dump searches – hh final state studies

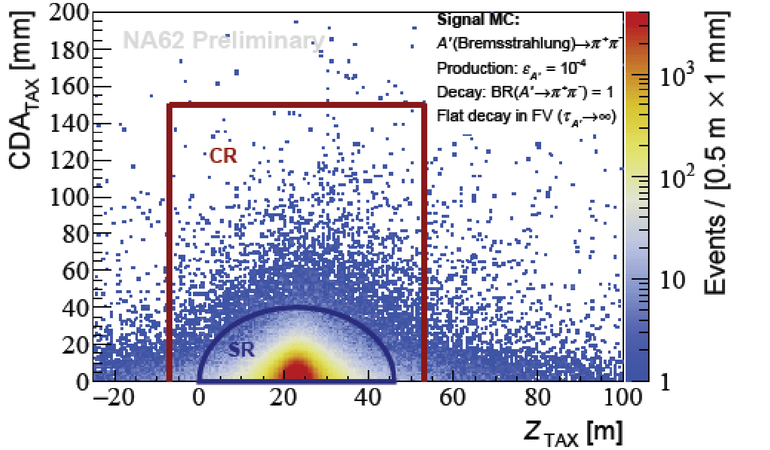


Figure: $A' \to \pi^+\pi^-$ MC: control (CR) and signal (SR) region

- In a model-independent approach $BR_{X\to\pi^+\pi^-} = 1$, $N_{exp}(M_X, \Gamma_X) = N_{POT}\, \chi_{pp\to X}(C_{ref})\, P_{rd}\, A_{acc}\, A_{trig}$
- $\chi_{pp\to X}(C_{ref})$: messenger prod. probability for ref. coupling
- P_{rd}: probability to reach NA62 FV and decay therein
- $A_{acc}\, A_{trig}$: signal selection and trigger efficiencies

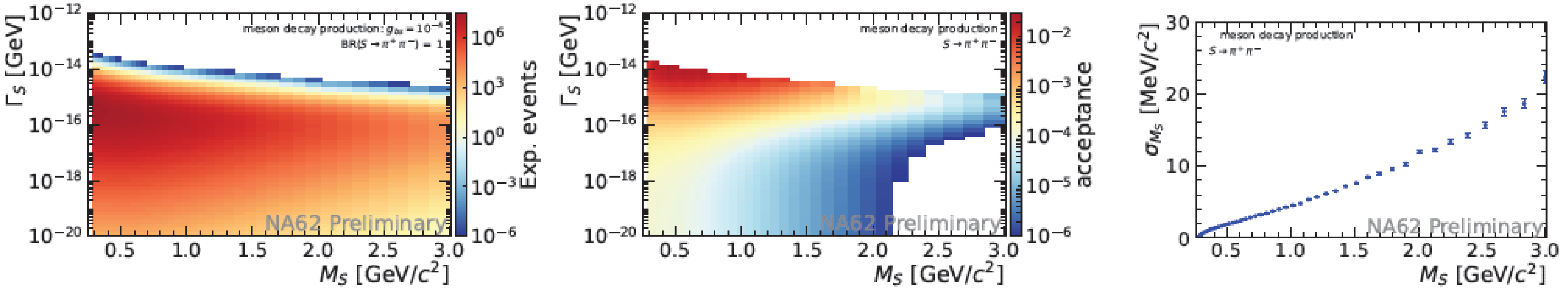


Figure: Left: expected number of $S \to \pi^+\pi^-$ selected events, for $g_{bs} = 10^{-4}$, BR = 1. Center: selection acceptance given a messenger decay in the FV. Right: Mass resolution of the reconstructed messenger.

if observed,
M_S could be resolved
at a per cent level

- Distributions evaluated for 36 combinations of production and decay channels

Background determination for hh analysis

- **Combinatorial and neutrino-induced backgrounds**
- **Prompt background**:
- **Upstream background**

- For the h^+h^- analysis channels at 68% CL:

Channel	$N_{\mathrm{exp,CR}} \pm \delta N_{\mathrm{exp,CR}}$	$N_{\mathrm{exp,SR}} \pm \delta N_{\mathrm{exp,SR}}$
$\pi^+\pi^-$	0.013 ± 0.007	0.007 ± 0.005
$\pi^+\pi^-\gamma$	0.031 ± 0.016	0.007 ± 0.004
$\pi^+\pi^-\pi^0$	$(1.3^{+4.4}_{-1.0}) \times 10^{-7}$	$(1.2^{+4.3}_{-1.0}) \times 10^{-7}$
$\pi^+\pi^-\pi^0\pi^0$	$(1.6^{+7.6}_{-1.4}) \times 10^{-8}$	$(1.6^{+7.4}_{-1.4}) \times 10^{-8}$
$\pi^+\pi^-\eta$	$(7.3^{+27.0}_{-6.1}) \times 10^{-8}$	$(7.0^{+26.2}_{-5.8}) \times 10^{-8}$
K^+K^-	$(4.7^{+15.7}_{-3.9}) \times 10^{-7}$	$(4.6^{+15.2}_{-3.8}) \times 10^{-7}$
$K^+K^-\pi^0$	$(1.6^{+3.2}_{-1.2}) \times 10^{-9}$	$(1.5^{+3.1}_{-1.2}) \times 10^{-9}$

background-free hypothesis not only at $N_{\mathrm{POTs}} = 1.4 \times 10^{17}$ but also in the future full **Run 2 dataset** of $N_{\mathrm{POTs}} = 10^{18}$

NA62 Dark Messenger Beam Dump searches – hh final state studies

Table: Expected number of background events (68% CL) in CR and SR. Minimum number of observed events $N_{\rm obs}$ for a background-only p-value above 5σ in SR and SR+CR (global significance, flat background in $m_{\rm inv}$ assumed).

Channel	$N_{\rm exp,CR} \pm \delta N_{\rm exp,CR}$	$N_{\rm exp,SR} \pm \delta N_{\rm exp,SR}$	$N^{p>5\sigma}_{\rm obs,SR}$	$N^{p>5\sigma}_{\rm obs,SR+CR}$
$\pi^+\pi^-$	0.013 ± 0.007	0.007 ± 0.005	3	4
$\pi^+\pi^-\gamma$	0.031 ± 0.016	0.007 ± 0.004	3	5
$\pi^+\pi^-\pi^0$	$(1.3^{+4.4}_{-1.0}) \times 10^{-7}$	$(1.2^{+4.3}_{-1.0}) \times 10^{-7}$	1	1
$\pi^+\pi^-\pi^0\pi^0$	$(1.6^{+7.6}_{-1.4}) \times 10^{-8}$	$(1.6^{+7.4}_{-1.4}) \times 10^{-8}$	1	1
$\pi^+\pi^-\eta$	$(7.3^{+27.0}_{-6.1}) \times 10^{-8}$	$(7.0^{+26.2}_{-5.8}) \times 10^{-8}$	1	1
K^+K^-	$(4.7^{+15.7}_{-3.9}) \times 10^{-7}$	$(4.6^{+15.2}_{-3.8}) \times 10^{-7}$	1	2
$K^+K^-\pi^0$	$(1.6^{+3.2}_{-1.2}) \times 10^{-9}$	$(1.5^{+3.1}_{-1.2}) \times 10^{-9}$	1	1

NA62 Dark Messenger hh final state ...

essentially background free not only for $N_{POT} = 1.4 \times 10^{17}$,

but also for the complete Run 2 in the future for $N_{POT} = 10^{18}$.

NA62 Dark Messenger searches –
Results for both hadronic and leptonic final states

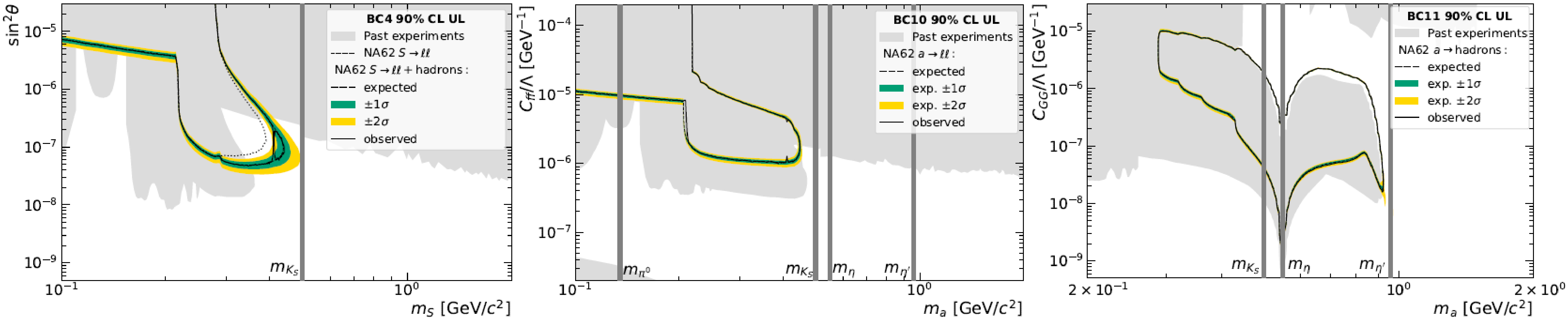


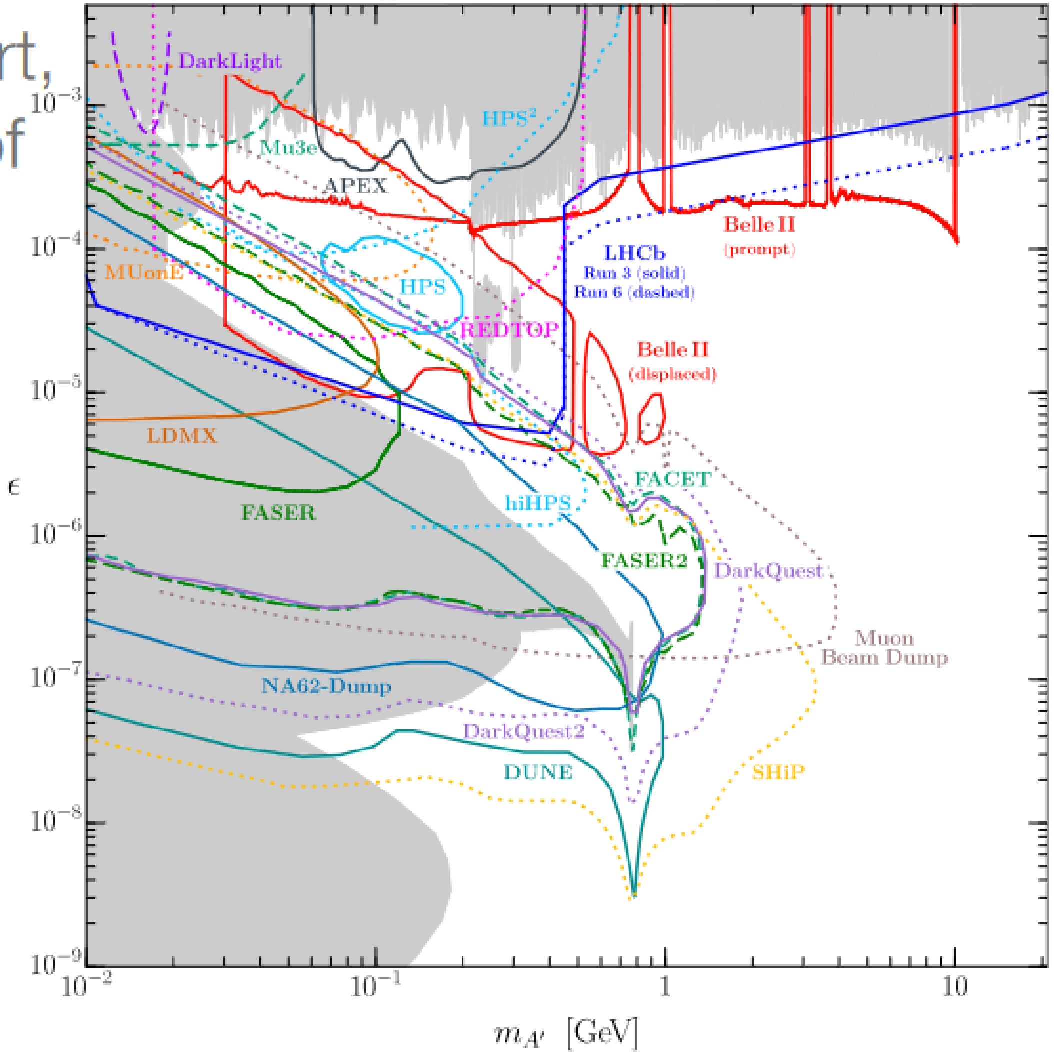
Figure: The observed 90% CL exclusion contours in BC4 (left), BC10 (center) and BC11 (right) benchmarks together with the expected $\pm 1\sigma$ and $\pm 2\sigma$ bands (theory uncertainty not included).

NA62 Collaboration, *Search for hadronic decays of feebly-interacting particles at NA62, Eur. Phys. J C (2025) 85:571.*

Searching for the dark sector in the laboratory

- Extensive, world-wide effort, including a large number of dedicated projects.

Chris Hearty DISCRETE Dec'24



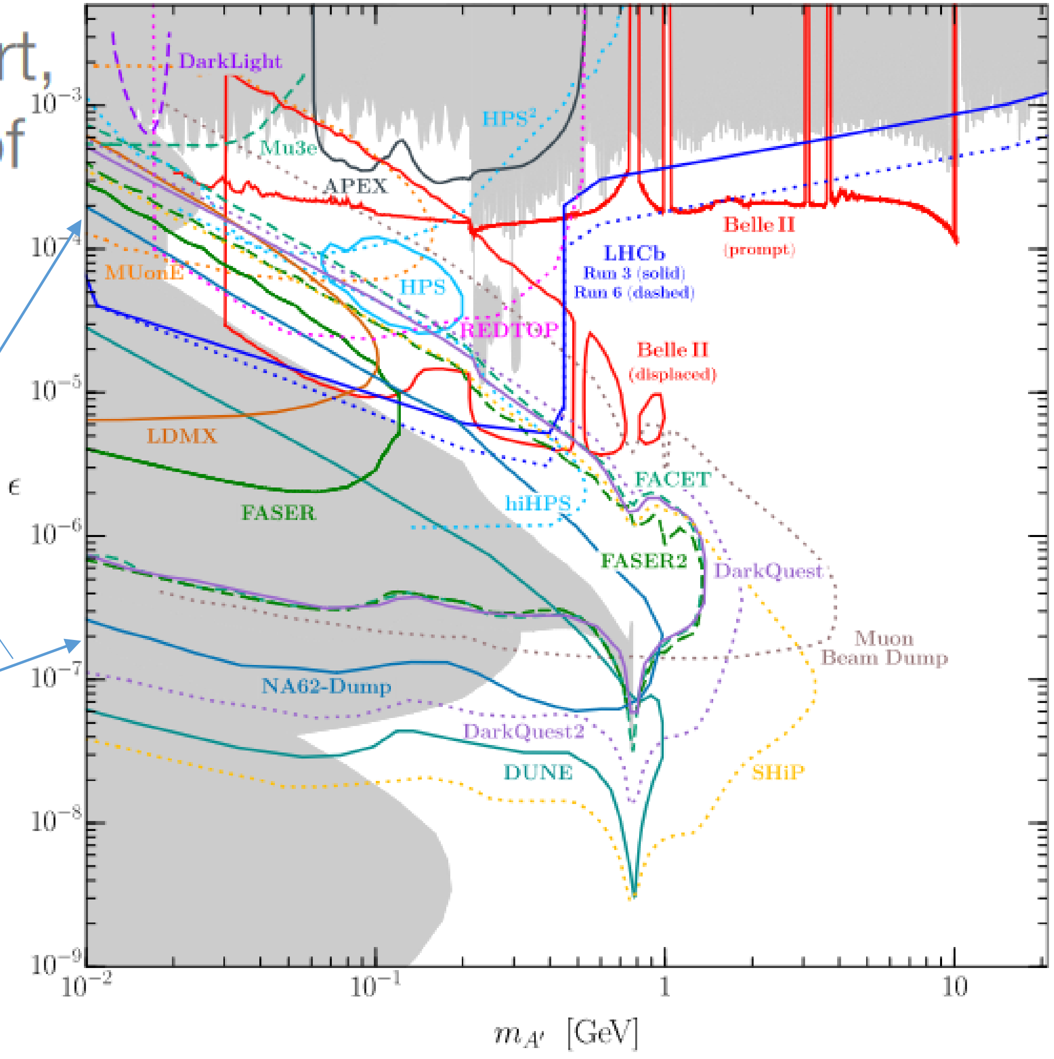
Batell, Blinov, Hearty, McGehee, arXiv 2207.06905 (2022)

Searching for the dark sector in the laboratory

- Extensive, world-wide effort, including a large number of dedicated projects.

Chris Hearty DISCRETE Dec'24

NA62 in Dump Mode



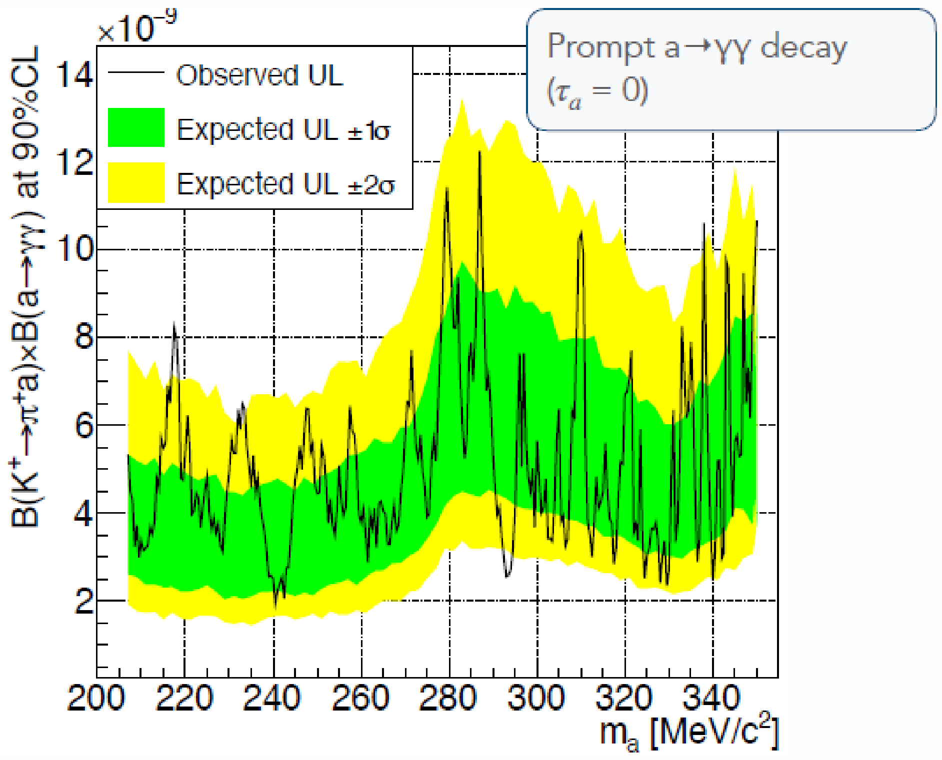
Batell, Blinov, Hearty, McGehee, arXiv 2207.06905 (2022)

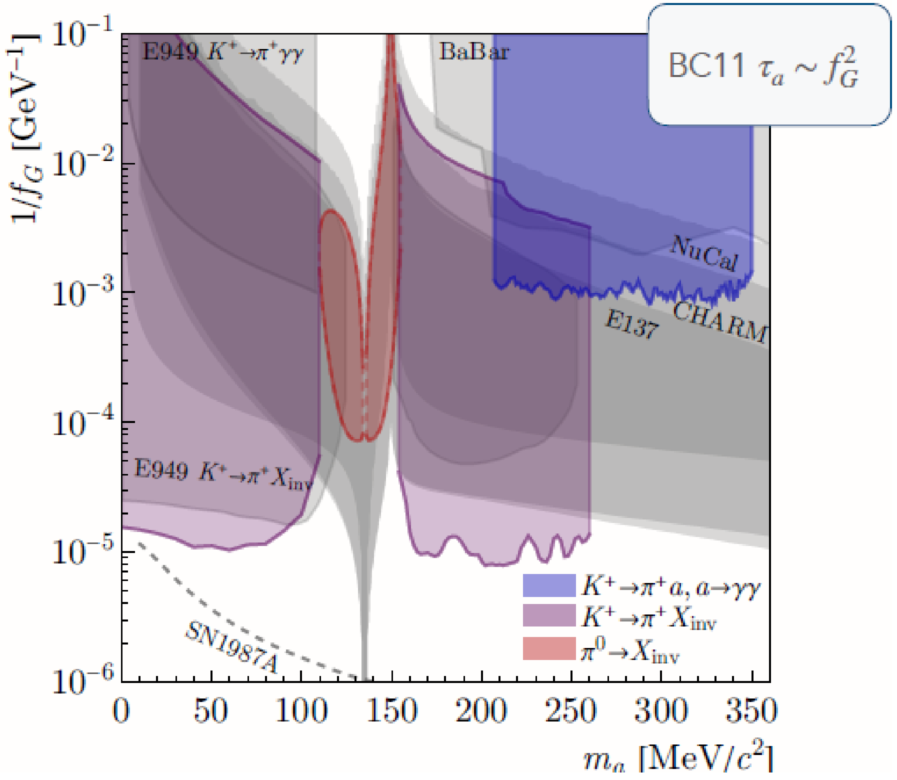
NA62 Axion-like particle (ALP) search in $K^+ \to \pi^+ a$, $a \to \gamma\gamma$
Results for photonic final states

NA62 Collaboration, *Phys.Lett* ***B 850*** *(2024) 138513.*

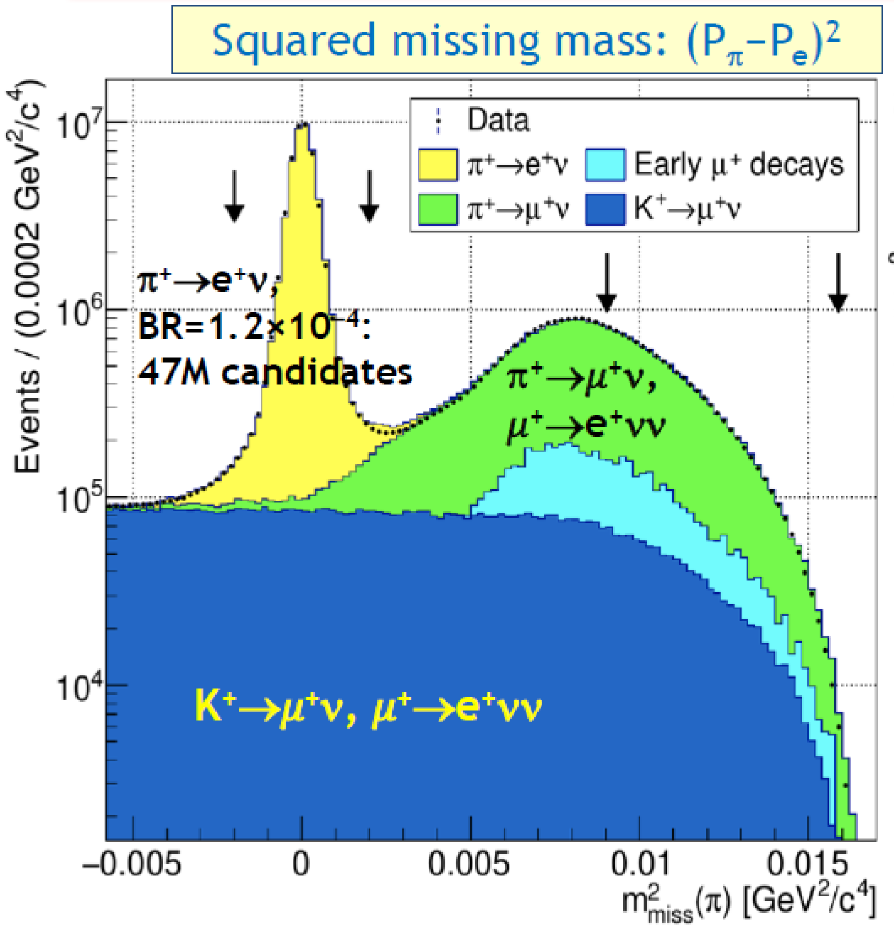
Peak search over $m_a = \sqrt{(P_K - P_\pi)^2}$ in the range 207-350 MeV/c² in steps of 0.5 MeV/c²

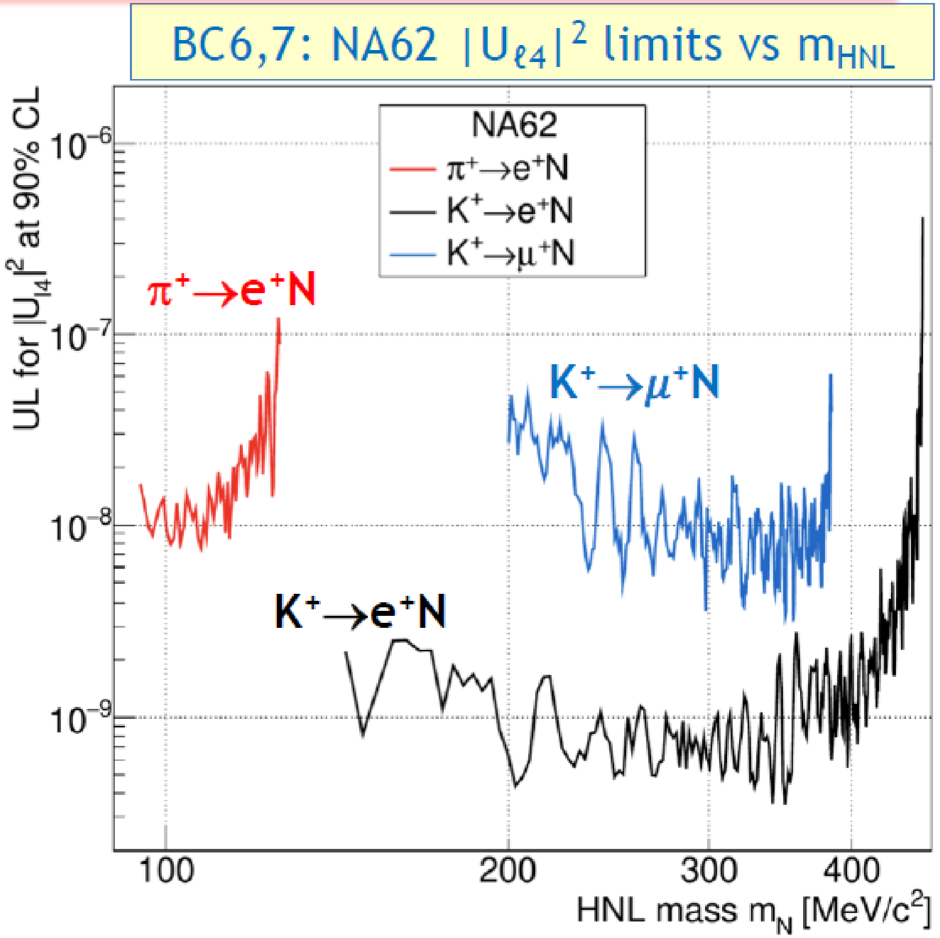
m_a resolution: from 2.0 MeV/c² to 0.2 MeV/c² across the search range





Search for Heavy Neutral Lepton production in π decays

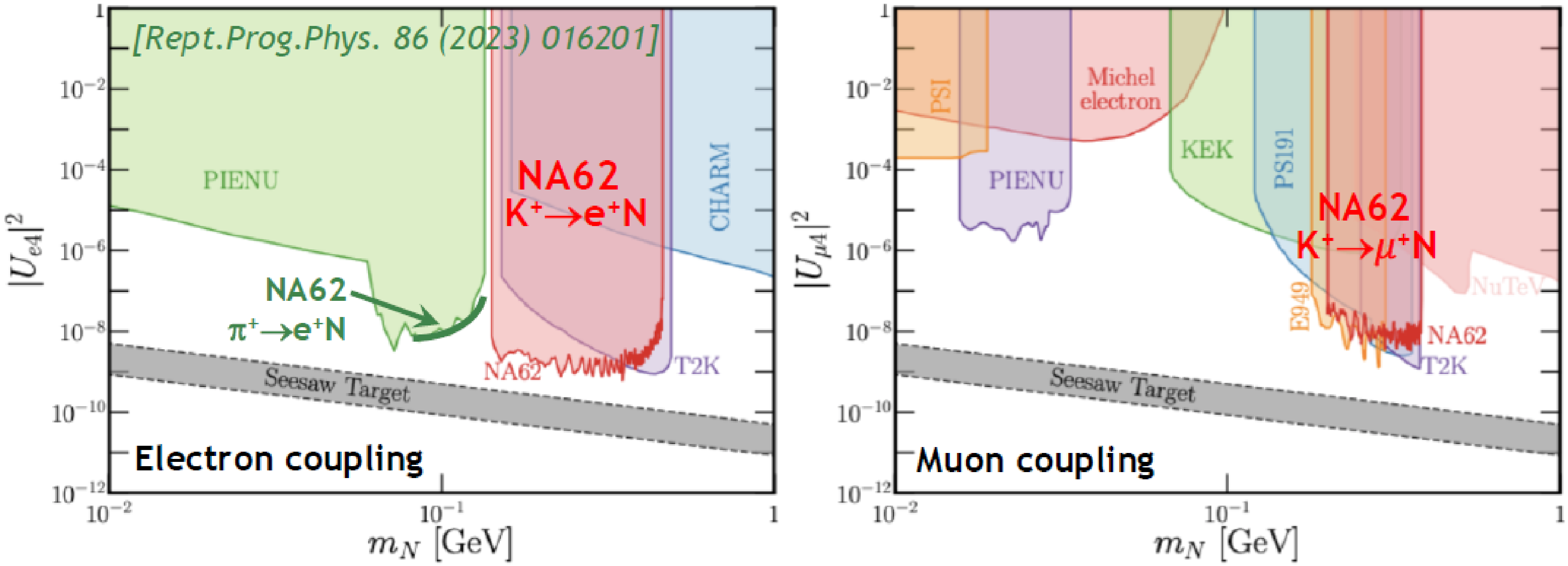




- The 2017–2024 dataset; $K_{\pi\nu\nu}$ trigger line (limited efficiency for beam pions).
- Number of π^+ decays in fiducial volume: $N_\pi = 6.5\times10^{12}$.
- Squared missing mass: $m^2_{miss} = (P_\pi - P_\ell)^2$, using GTK and STRAW trackers.

[arXiv:2507.07345]

BC6,7: $|U_{\ell 4}|^2$ limits vs m_{HNL} from production & decay searches



- For $|U_{e4}|^2$, NA62 improves on the T2K and PIENU limits.
- For $|U_{\mu 4}|^2$, NA62 has similar sensitivity to T2K and BNL-E949.

NA62 upper limit at **90%** CL: **$BR(K^+ \to \mu^+ \nu\nu\nu) < 1.0\times10^{-6}$**,
and similar limits of **$BR(K^+ \to \mu^+ \nu X_{inv})$**. *[PLB 816 (2021) 136259]*

Summary

The main goal of the NA62 Experiment remains the $\mathcal{B}(K^+ \to \pi^+ \nu \bar{\nu})$ measurement, however much broader new physics search has been performed

Blind searches for a **dark messenger particle decaying into ee, μμ, hadrons and γγ** have been performed on the 2021 data sample exploring new regions in the parameter space accessible to the **NA62 Experiment in the Beam-Dump mode**

With the $(1.43 \pm 0.28) \times 10^{17}$ POTs 90% CL upper limits have been derived, **excluding new regions** in the parameter space shown here in respective plots

X Searches in K^+, π^+ and π^0 decays follow from a unique large sample ~ 10^{13} events, are relatively simple and clean, and have low backgrounds

NA62 data taking is ongoing
The current NA62 Run will last by Summer 2026