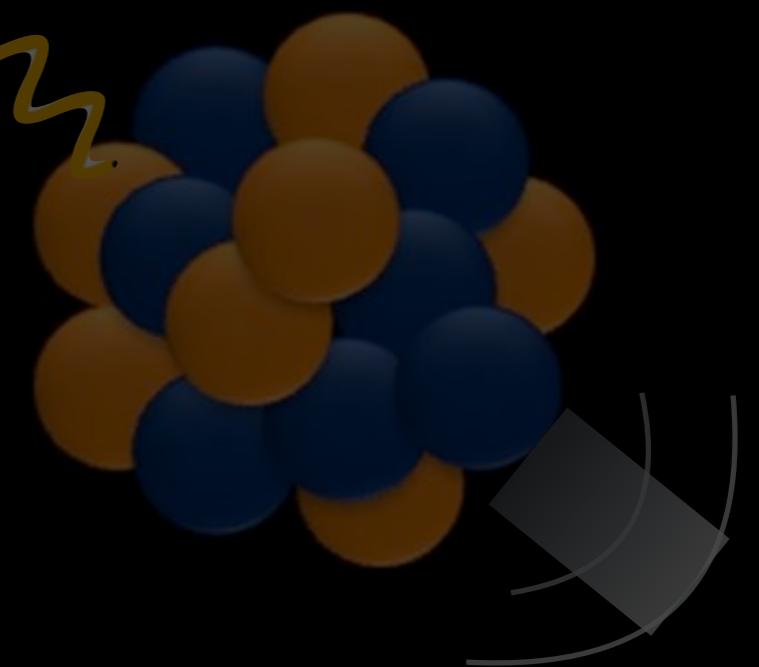
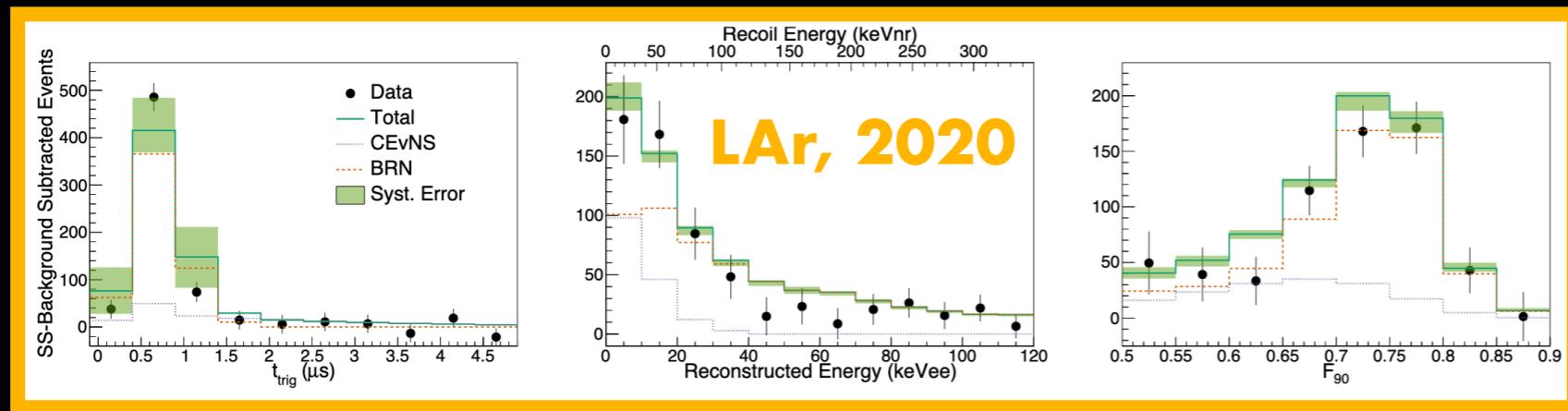
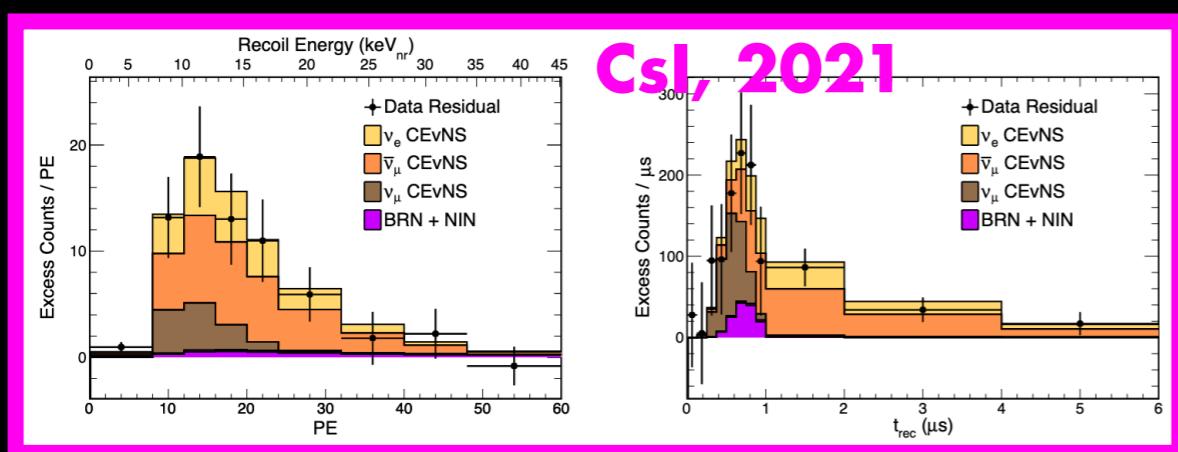
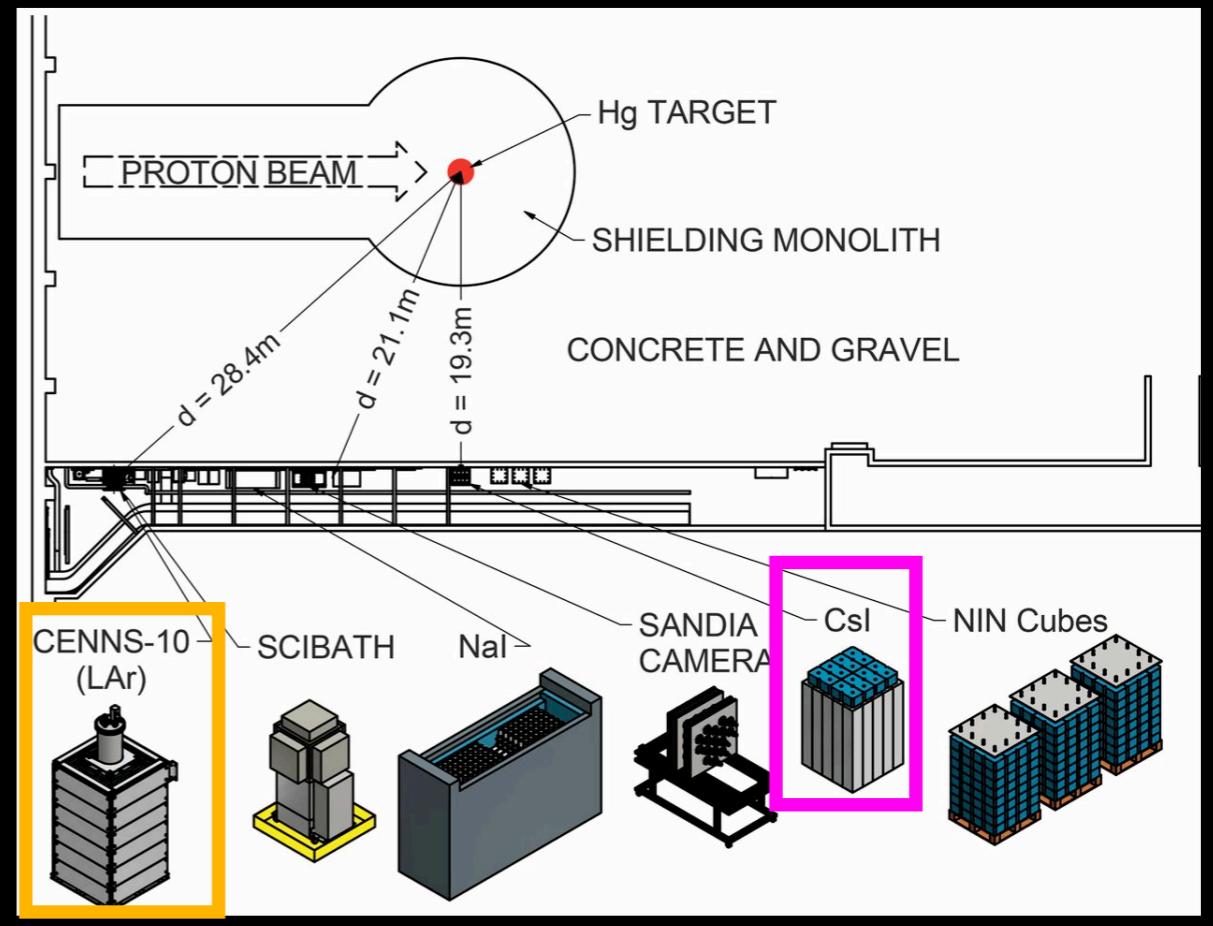
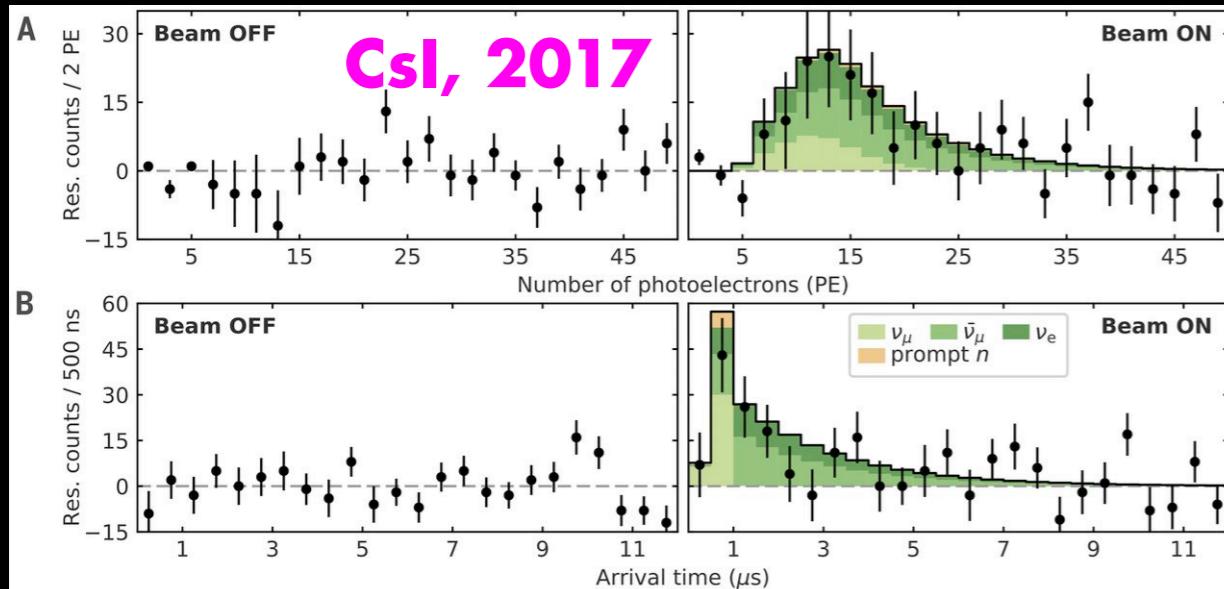


Valentina De Romeri
(IFIC Valencia - UV/CSIC)

New physics implications of COHERENT CsI+LAr data



Observation of CE ν NS by COHERENT



D. Akimov et al. (COHERENT). Science 357, 1123–1126 (2017)
D. Akimov et al. (COHERENT). 2110.07730
D. Akimov et al. (COHERENT). Phys. Rev. Lett. 126, 012002 (2021)
Daughhetee, BNL Physics Seminar 2020

Physics potential of CE ν NS

► EW precision tests:

- Weak mixing angle

► Nuclear physics

- Nuclear form factors
- Neutron radius and “skin”

► Supernovae

► Solar neutrinos

► New neutrino interactions

- Non-standard interactions
- Generalised interactions
- New mediators

► Neutrino properties

- Neutrino charge radius
- Magnetic moments

► Sterile neutrinos

► Dark matter

Brdar and Rodejohann, arXiv:1810.03626; Chang and Liao, arXiv:2002.10275;
Li et al, arXiv:2005.01543; CONUS, arXiv:2110.02174; Cadeddu et al,
arXiv:1710.02730, arXiv:2005.01645, arXiv:1908.06045; Aristizabal Sierra
et al, arXiv:1902.07398; Huang and Chen, arXiv:1902.07625; Papoulias et al,
arXiv:1903.03722, arXiv:1907.11644; Miranda et al, arXiv:2003.12050
Papoulias et al, arXiv:1711.09773, arXiv:1907.11644; Cadeddu et al,
arXiv:1808.10202, arXiv:2005.01645, arXiv:1908.06045, arXiv:2205.09484;
Huang and Chen, arXiv:1902.07625; Miranda et al, arXiv:1902.09036,
arXiv:2003.12050; Khan and Rodejohann, arXiv:1907.12444; COHERENT,
arXiv:2110.07730; Papoulias and Kosmas, arXiv:1711.09773; Blanco et al,
arXiv:1901.08094; Miranda et al, arXiv:1902.09036

Cerdeño et al, arXiv:1604.01025; Farzan et al, arXiv:1802.05171; Aristizabal
Sierra et al, arXiv:1806.07424; Khan and Rodejohann, arXiv:1907.12444;
Aristizabal Sierra et al, arXiv:1910.12437; Miranda et al, arXiv:2003.12050;
Aristizabal Sierra et al, JHEP 09 (2019) 069; Suliga and Tamborra,
arXiv:2010.14545; CONUS, arXiv:2110.02174; Li and Xia, arXiv:2201.05015;
Atzori Corona et al, arXiv:2202.11002; Liao et al, arXiv:2202.10622; Coloma
et al, arXiv:2202.10829; Lindner et al, arXiv:1612.04150; Aristizabal Sierra
et al, arXiv:1806.07424; Aristizabal Sierra et al, JCAP 01 (2022) 01, 055,
.....

Physics potential of CE ν NS

- ▶ SM precision tests:
 - Weak mixing angle
- ▶ Nuclear physics
 - Nuclear form factors
 - Neutron radius and “skin”
- ▶ Supernovae
- ▶ Solar neutrinos
- ▶ New neutrino interactions
 - Non-standard interactions
 - Generalised interactions
 - New light mediators
- ▶ Neutrino properties
 - Neutrino charge radius
 - Magnetic moments
- ▶ Sterile neutrinos
- ▶ Dark matter/dark sectors

THIS TALK

[VDR](#), [Miranda](#), [Papoulias](#), [Sanchez-García](#), [Tórtola](#) and [Valle](#), 2211.11905 [hep-ph]

Physics potential of CE ν NS

- ▶ SM precision tests:
 - Weak mixing angle

See next
talk by D.
Papoulias

- ▶ Nuclear physics
 - Nuclear form factors
 - Neutron radius and “skin”

- ▶ Supernovae

- ▶ Solar neutrinos

- ▶ New neutrino interactions
 - Non-standard interactions
 - Generalised interactions
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- ▶ Neutrino properties
 - Neutrino charge radius
 - Magnetic moments

- ▶ Sterile neutrinos

- ▶ Dark matter/dark sectors

VDR, Miranda, Papoulias, Sanchez-García, Tórtola and Valle, 2211.11905 [hep-ph]

Physics potential of CE ν NS

See talk by
G. Sanchez

- ▶ SM precision tests:
 - Weak mixing angle
- ▶ Nuclear physics
 - Nuclear form factors
 - Neutron radius and “skin”
- ▶ Supernovae
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- ▶ New neutrino interactions
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VDR, Miranda, Papoulias, Sanchez-García, Tórtola and Valle, 2211.11905 [hep-ph]

Statistical analysis

CsI

$$\chi^2_{\text{CsI}} \Big|_{\text{CE}\nu\text{NS}(\text{+ES})} = 2 \sum_{i=1}^9 \sum_{j=1}^{11} \left[N_{\text{th}}^{\text{CsI}} - N_{ij}^{\text{exp}} + N_{ij}^{\text{exp}} \ln \left(\frac{N_{ij}^{\text{exp}}}{N_{\text{th}}^{\text{CsI}}} \right) \right] + \sum_{k=0}^{4(5)} \left(\frac{\alpha_k}{\sigma_k} \right)^2.$$

$$N_{\text{th}}^{\text{CsI, CE}\nu\text{NS+ES}} = (1 + \alpha_0 + \alpha_5) N_{ij}^{\text{CE}\nu\text{NS}}(\alpha_4, \alpha_6, \alpha_7) + (1 + \alpha_0) N_{ij}^{\text{ES}}(\alpha_6, \alpha_7) \\ + (1 + \alpha_1) N_{ij}^{\text{BRN}}(\alpha_6) + (1 + \alpha_2) N_{ij}^{\text{NIN}}(\alpha_6) + (1 + \alpha_3) N_{ij}^{\text{SSB}}$$

COHERENT Collaboration Phys.Rev.Lett. 129 no. 8, (2022) 081801

- $\sigma_0 = 11\%$ efficiency + flux
- $\sigma_1 = 25\%$ BRN
- $\sigma_2 = 35\%$ NIN
- $\sigma_3 = 2.1\%$ SSB
- $\sigma_5 = 3.8\%$ QF
- $\sigma_4 = 5\%$ ($R_A = 1.23 A^{1/3}(1 + \alpha_4)$)
- α_6 beam timing (no prior)
- α_7 CEvNS efficiency

LAr

- $\sigma_0 = 13\%$
normal. CEvNS
- $\sigma_3 = 0.79\%$ SS
- $\sigma_8 = 100\%$
delayed BRN
- $\sigma_4 = 32\%$
prompt BRN
- $\beta_1, \beta_2, \beta_5, \beta_6$ and
 β_7 shape
uncertainties

$$\chi^2_{\text{LAr}} = \sum_{i=1}^{12} \sum_{j=1}^{10} \frac{1}{\sigma_{ij}^2} \left[(1 + \beta_0 + \beta_1 \Delta_{\text{CE}\nu\text{NS}}^{F_{90+}} + \beta_1 \Delta_{\text{CE}\nu\text{NS}}^{F_{90-}} + \beta_2 \Delta_{\text{CE}\nu\text{NS}}^{t_{\text{trig}}}) N_{ij}^{\text{CE}\nu\text{NS}} \right. \\ \left. + (1 + \beta_3) N_{ij}^{\text{SSB}} \right. \\ \left. + (1 + \beta_4 + \beta_5 \Delta_{\text{pBRN}}^{E_+} + \beta_5 \Delta_{\text{pBRN}}^{E_-} + \beta_6 \Delta_{\text{pBRN}}^{t_{\text{trig}}^+} + \beta_6 \Delta_{\text{pBRN}}^{t_{\text{trig}}^-} + \beta_7 \Delta_{\text{pBRN}}^{t_{\text{trig}}^w}) N_{ij}^{\text{pBRN}} \right. \\ \left. + (1 + \beta_8) N_{ij}^{\text{dBRN}} - N_{ij}^{\text{exp}} \right]^2 \\ + \sum_{k=0,3,4,8} \left(\frac{\beta_k}{\sigma_k} \right)^2 + \sum_{k=1,2,5,6,7} (\beta_k)^2,$$

Atzori-Corona et al. 2205.09484, COHERENT Collaboration arXiv:2006.12659

Statistical analysis

$$\chi^2_{\text{CsI}} \Big|_{\text{CE}\nu\text{NS} (+\text{ES})} = 2 \sum_{i=1}^9 \sum_{j=1}^{11} \left[N_{\text{th}}^{\text{CsI}} - N_{ij}^{\text{exp}} + N_{ij}^{\text{exp}} \ln \left(\frac{N_{ij}^{\text{exp}}}{N_{\text{th}}^{\text{CsI}}} \right) \right] + \sum_{k=0}^{4(5)} \left(\frac{\alpha_k}{\sigma_k} \right)^2.$$

► CsI data set:

$$N_{\text{th}}^{\text{CsI, CE}\nu\text{NS+ES}} = (1 + \alpha_0 + \alpha_5) N_{ij}^{\text{CE}\nu\text{NS}}(\alpha_4, \alpha_6, \alpha_7) + (1 + \alpha_0) N_{ij}^{\text{ES}}(\alpha_6, \alpha_7) + (1 + \alpha_1) N_{ij}^{\text{BLN}}(\alpha_6) + (1 + \alpha_2) N_{ij}^{\text{NIN}}(\alpha_6) + (1 + \alpha_3) N_{ij}^{\text{SSB}}$$

- Consider 2021 data
- Include ES events
- Time distributions (with uncertainty on beam timing)

COHERENT Collaboration Phys.Rev.Lett. 129 no. 8, (2022) 081801

- $\sigma_0 = 11\%$ efficiency + flux
- $\sigma_1 = 25\%$ BRN
- $\sigma_2 = 35\%$ NIN
- $\sigma_3 = 2.1\%$ SSB
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- $\sigma_4 = 5\%$ ($R_A = 1.23 A^{1/3}(1 + \alpha_4)$)
- α_6 beam timing (no prior)
- α_7 CEvNS efficiency

► LAr data set:

- $\sigma_0 = 13\%$ normal. CEvNS
- $\sigma_3 = 0.79\%$ SS
- $\sigma_8 = 100\%$ delayed BRN
- $\sigma_4 = 32\%$ prompt BRN
- $\beta_1, \beta_2, \beta_5, \beta_6$ and β_7 shape uncertainties

$$\begin{aligned} & \sum_{i=1}^{12} \sum_{j=1}^{10} \frac{1}{\sigma_{ij}} \left[(1 + \beta_0 \Delta_{\text{CE}\nu\text{NS}}^{F_{90-}} + \beta_1 \Delta_{\text{CE}\nu\text{NS}}^{F_{90+}} + \beta_2 \Delta_{\text{CE}\nu\text{NS}}^{t_{\text{trig}}}) N_{ij}^{\text{CE}\nu\text{NS}} \right. \\ & \quad + (1 + \beta_3) N_{ij}^{\text{SSB}} \\ & \quad + (1 + \beta_4 + \beta_5 \Delta_{\text{pBRN}}^{E_+} + \beta_5 \Delta_{\text{pBRN}}^{E_-} + \beta_6 \Delta_{\text{pBRN}}^{t_{\text{trig}}^+} + \beta_6 \Delta_{\text{pBRN}}^{t_{\text{trig}}^-} + \beta_7 \Delta_{\text{pBRN}}^{t_{\text{trig}}^w}) N_{ij}^{\text{pBRN}} \\ & \quad \left. + (1 + \beta_8) N_{ij}^{\text{dBRN}} - N_{ij}^{\text{exp}} \right]^2 \\ & \quad + \sum_{k=0,3,4,8} \left(\frac{\beta_k}{\sigma_k} \right)^2 + \sum_{k=1,2,5,6,7} (\beta_k)^2, \end{aligned}$$

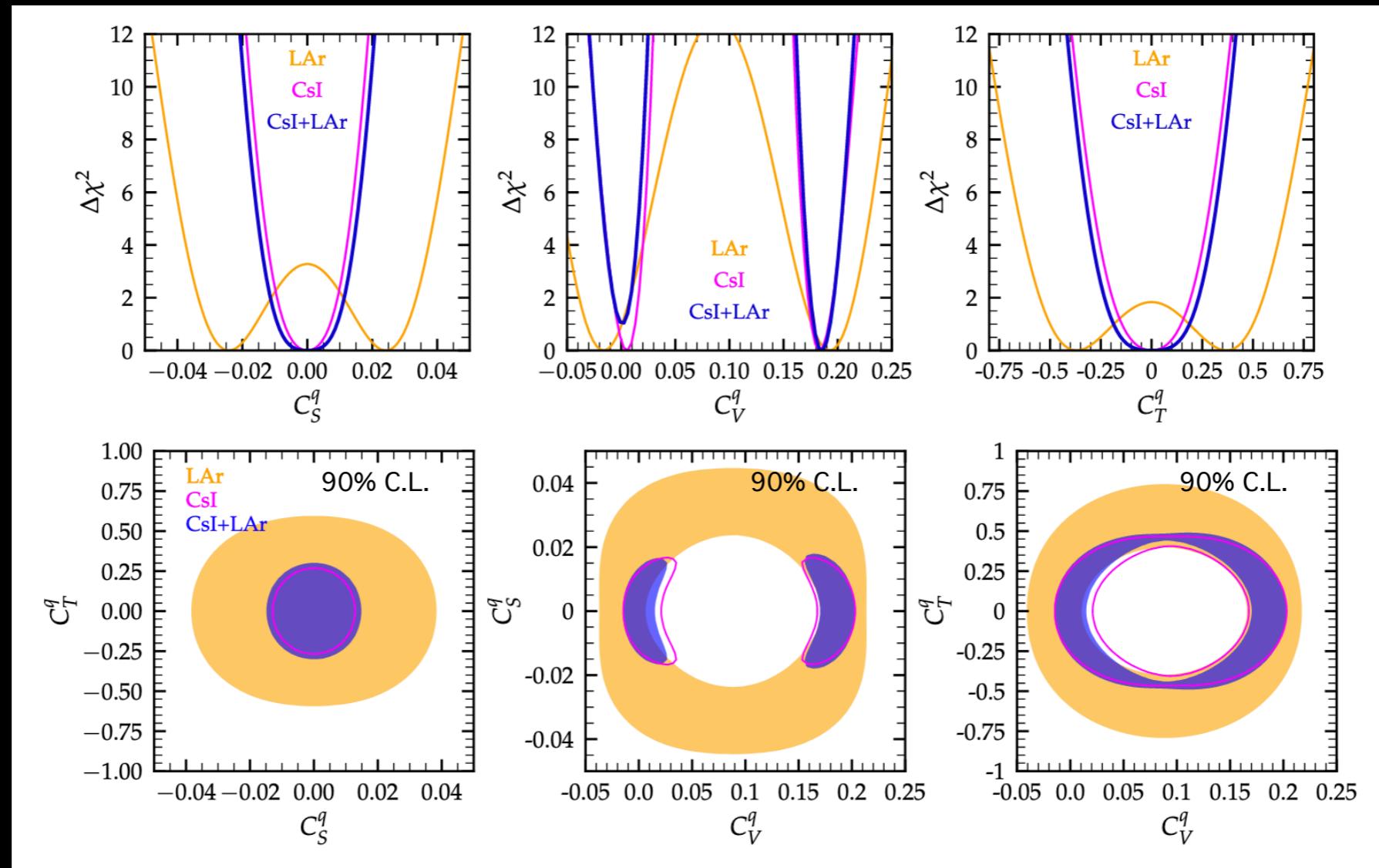
Atzori-Corona et al. 2205.09484, COHERENT Collaboration arXiv:2006.12659

New neutrino interactions: NGI

Additional types of Lorentz-invariant interactions involving scalar, vector and tensor terms

$$\mathcal{L}_{\text{eff}}^{\text{NGI}} = \frac{G_F}{\sqrt{2}} \sum_{X=S,P,V,A,T} [\bar{\nu} \Gamma^X \nu] [\bar{q} \Gamma_X (C_X^q + i\gamma_5 D_X^q) q]$$

Lee & Yang, Phys. Rev. 104 (1956) 254-258
 Lindner et al., JHEP 03 (2017) 097
 Aristizabal, VDR, Rojas Phys. Rev. D 98 (2018) 075018
 Flores et al. Phys. Rev. D 105 no. 5, (2022) 05501
 ...



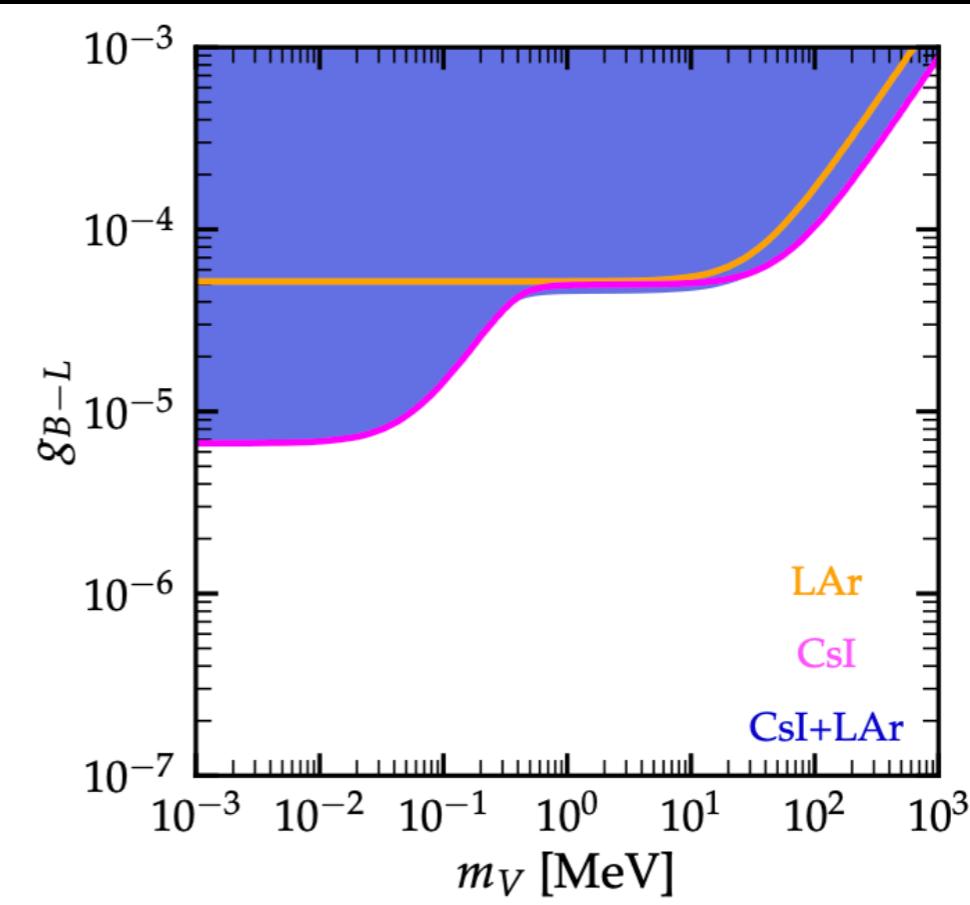
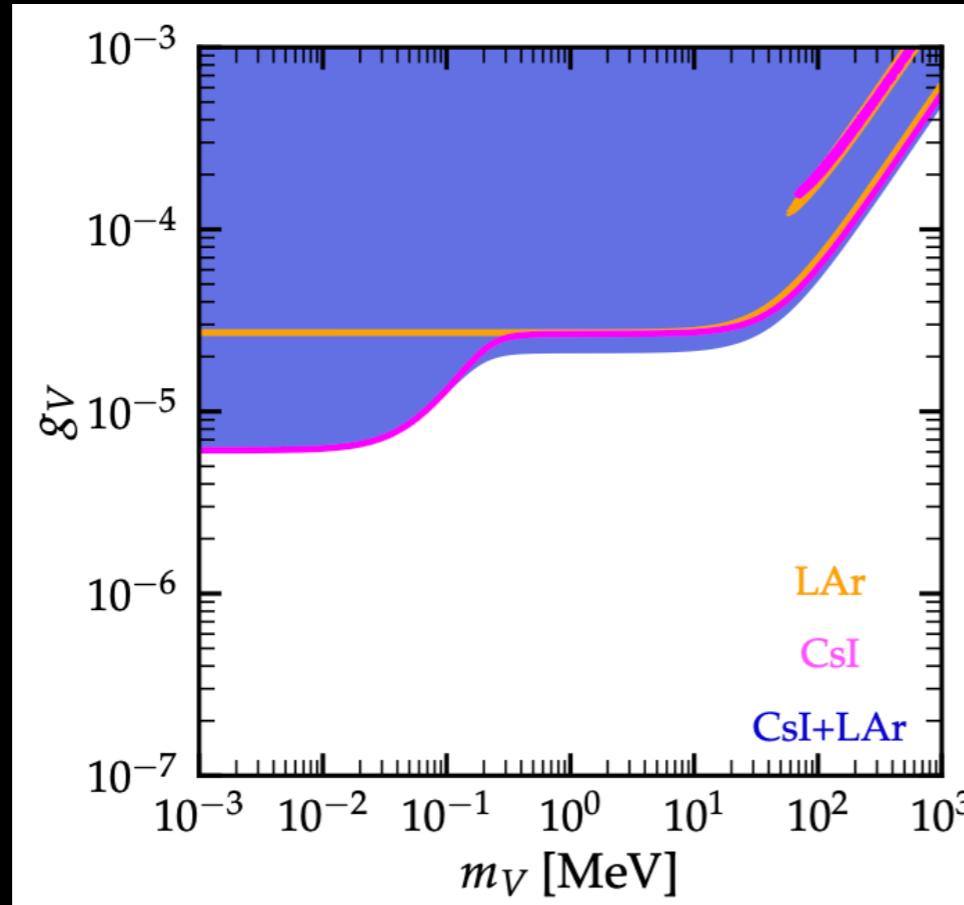
New neutrino interactions: LV

$$\left. \frac{d\sigma_{\nu_\ell N}}{dE_{nr}} \right|_{CE\nu NS}^{LV} = \left(1 + \kappa \frac{C_V}{\sqrt{2}G_F Q_V^{\text{SM}} (2m_N E_{nr} + \boxed{m_V^2})} \right)^2 \left. \frac{d\sigma_{\nu_\ell N}}{dE_{nr}} \right|_{CE\nu NS}^{\text{SM}}$$

$$C_V = g_{\nu V} [(2g_{uV} + g_{dV}) Z + (g_{uV} + 2g_{dV}) N]$$

$$g_X = \sqrt{g_{\nu X} g_{fX}}; f = \{u, d\}$$

$\kappa = 1$ for universal couplings and $\kappa = -1/3$ in the B – L model



VDR, Miranda, Papoulias, Sanchez-García, Tórtola and Valle, 2211.11905 [hep-ph]

Complementary analyses in: Coloma et al. 2202.10829, Atzori-Corona et al. 2205.09484

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New neutrino interactions: LS and LT

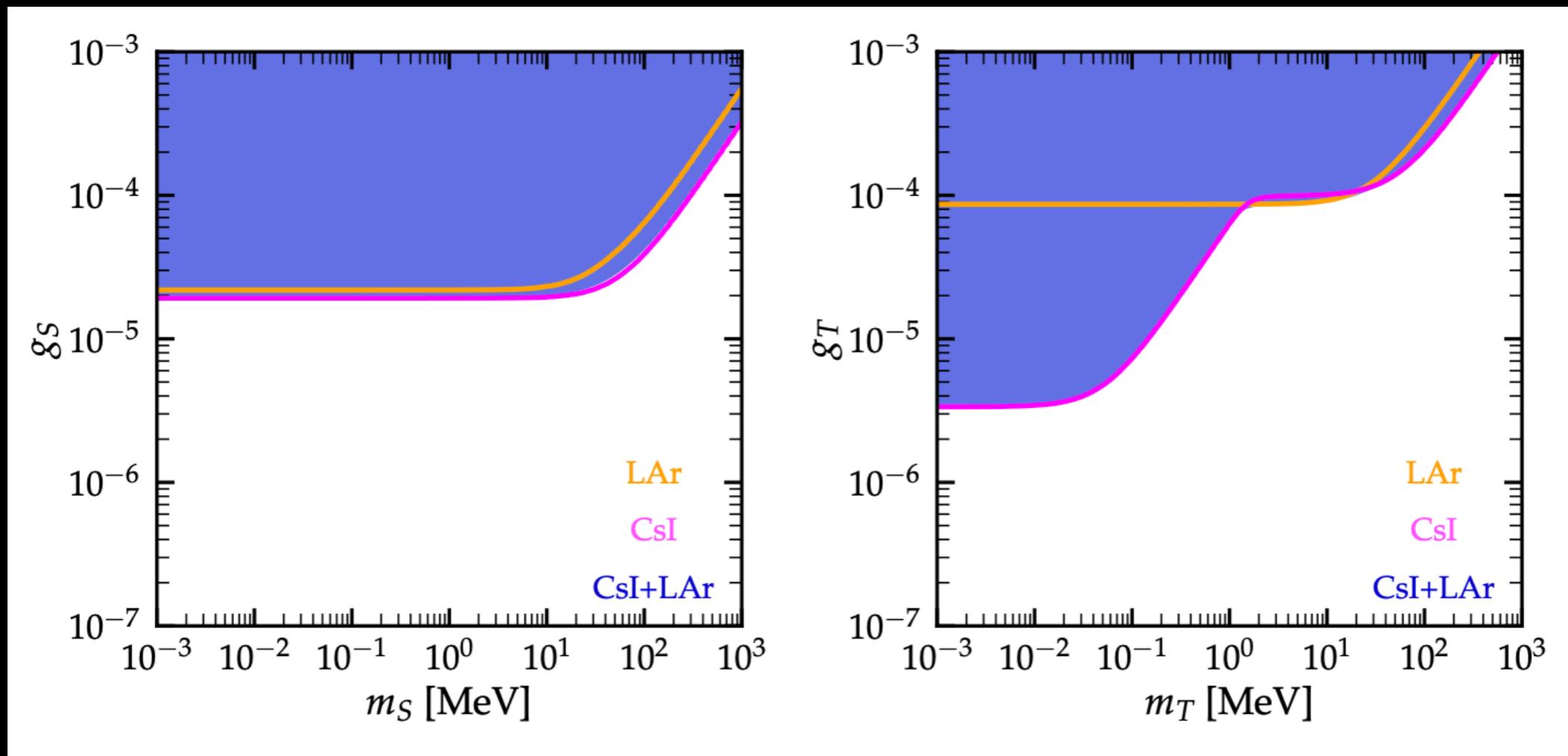
$$\frac{d\sigma_{\nu_\ell N}}{dE_{\text{nr}}} \Big|_{\text{CE}\nu\text{NS}}^{\text{LS}} = \frac{m_N^2 E_{\text{nr}} C_S^2}{4\pi E_\nu^2 (2m_N E_{\text{nr}} + m_S^2)^2} F_W^2(|\vec{q}|^2)$$

$$C_S = g_{\nu S} \left(Z \sum_q g_{qS} \frac{m_p}{m_q} f_q^p + N \sum_q g_{qS} \frac{m_n}{m_q} f_q^n \right)$$

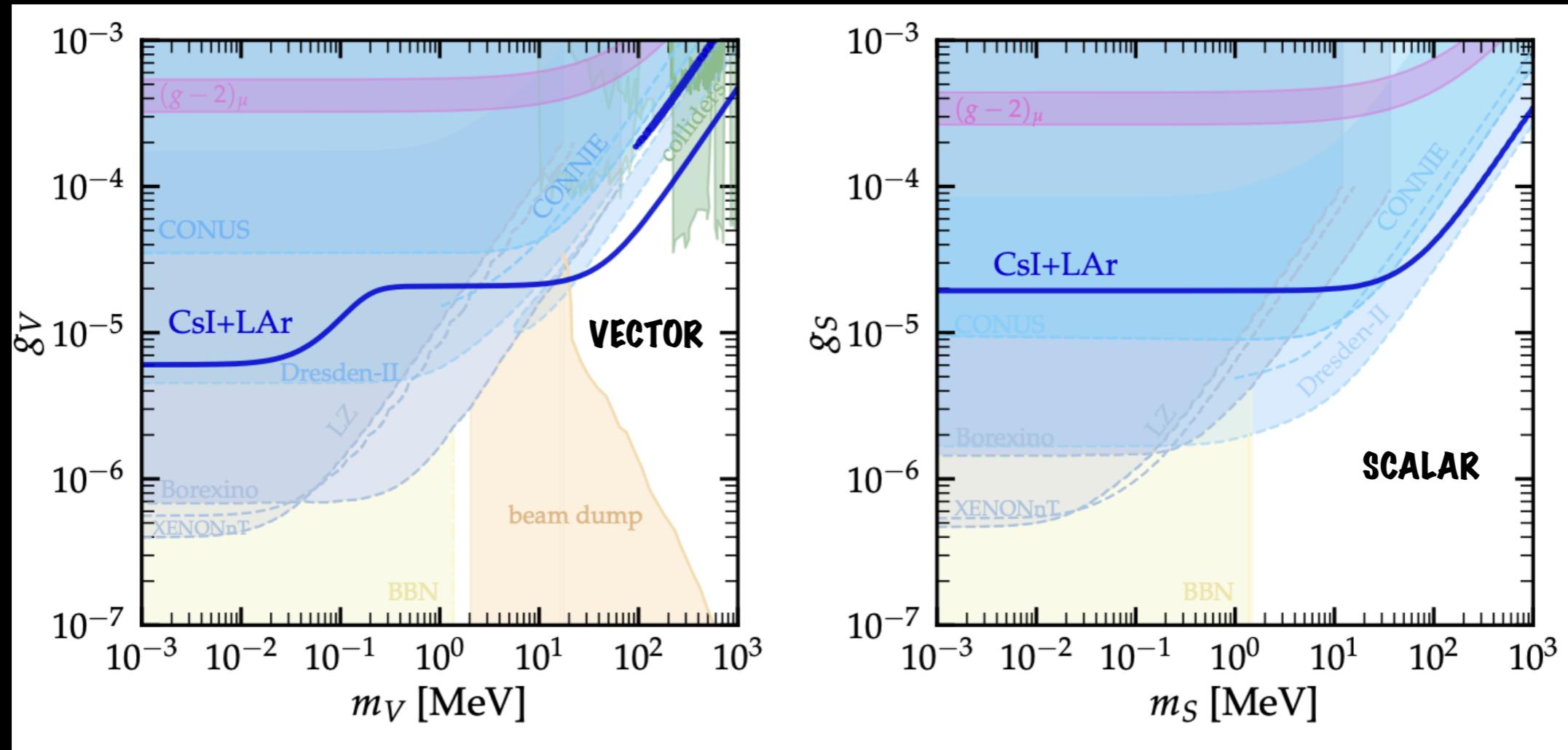
$$\frac{d\sigma_{\nu_\ell N}}{dE_{\text{nr}}} \Big|_{\text{CE}\nu\text{NS}}^{\text{LT}} = \frac{m_N (4E_\nu^2 - m_N E_{\text{nr}}) C_T^2}{2\pi E_\nu^2 (2m_N E_{\text{nr}} + m_T^2)^2} F_W^2(|\vec{q}|^2)$$

$$C_T = g_{\nu T} \left(Z \sum_q g_{qT} \delta_q^p + N \sum_q g_{qT} \delta_q^n \right)$$

$$g_X = \sqrt{g_{\nu X} g_{fX}}$$



New light mediators: summary



VDR, Miranda, Papoulias, Sanchez-García, Tórtola and Valle, 2211.11905 [hep-ph]

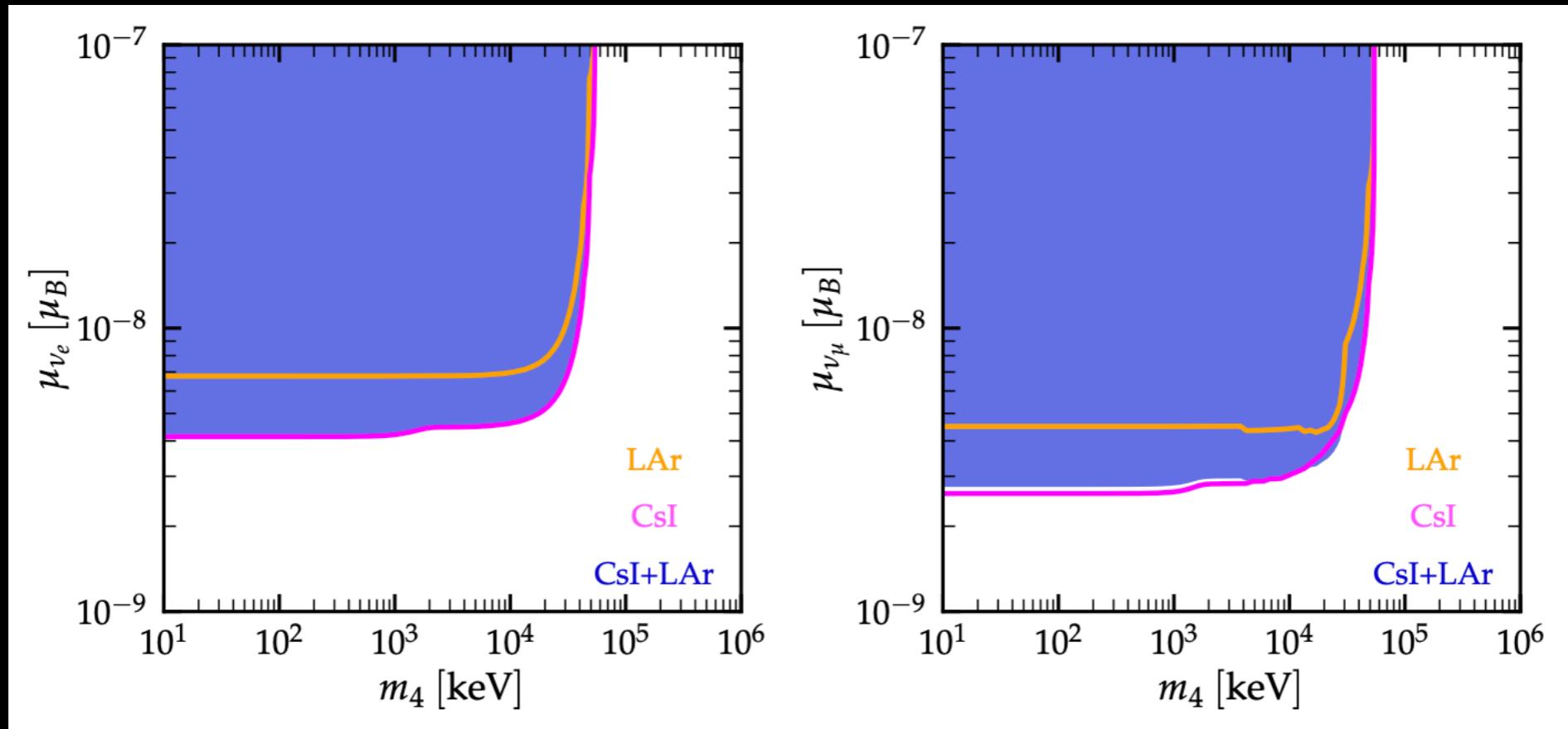
Sterile neutrino dipole portal

Transition of an active neutrino to a massive sterile state, induced by a magnetic coupling:
 $\nu_L + N \rightarrow F_4 + N$

$$\mathcal{L} = \bar{\nu} \sigma_{\mu\nu} \lambda \nu_R F^{\mu\nu} + \text{H.c.}$$

$$m_4^2 \lesssim 2m_N E_r \left(\sqrt{\frac{2}{m_N E_r}} E_\nu - 1 \right)$$

$$\left. \frac{d\sigma}{dE_r} \right|_{DP} = \alpha_{EM} \mu_{\nu, \text{Eff}}^2 F^2(q^2) Z^2 \left[\frac{1}{E_r} - \frac{1}{E_\nu} - \frac{m_4^2}{2E_\nu E_r m_N} \left(1 - \frac{E_r}{2E_\nu} + \frac{m_N}{2E_\nu} \right) + \frac{m_4^4(E_r - m_N)}{8E_\nu^2 E_r^2 m_N^2} \right]$$



Sterile neutrino oscillations

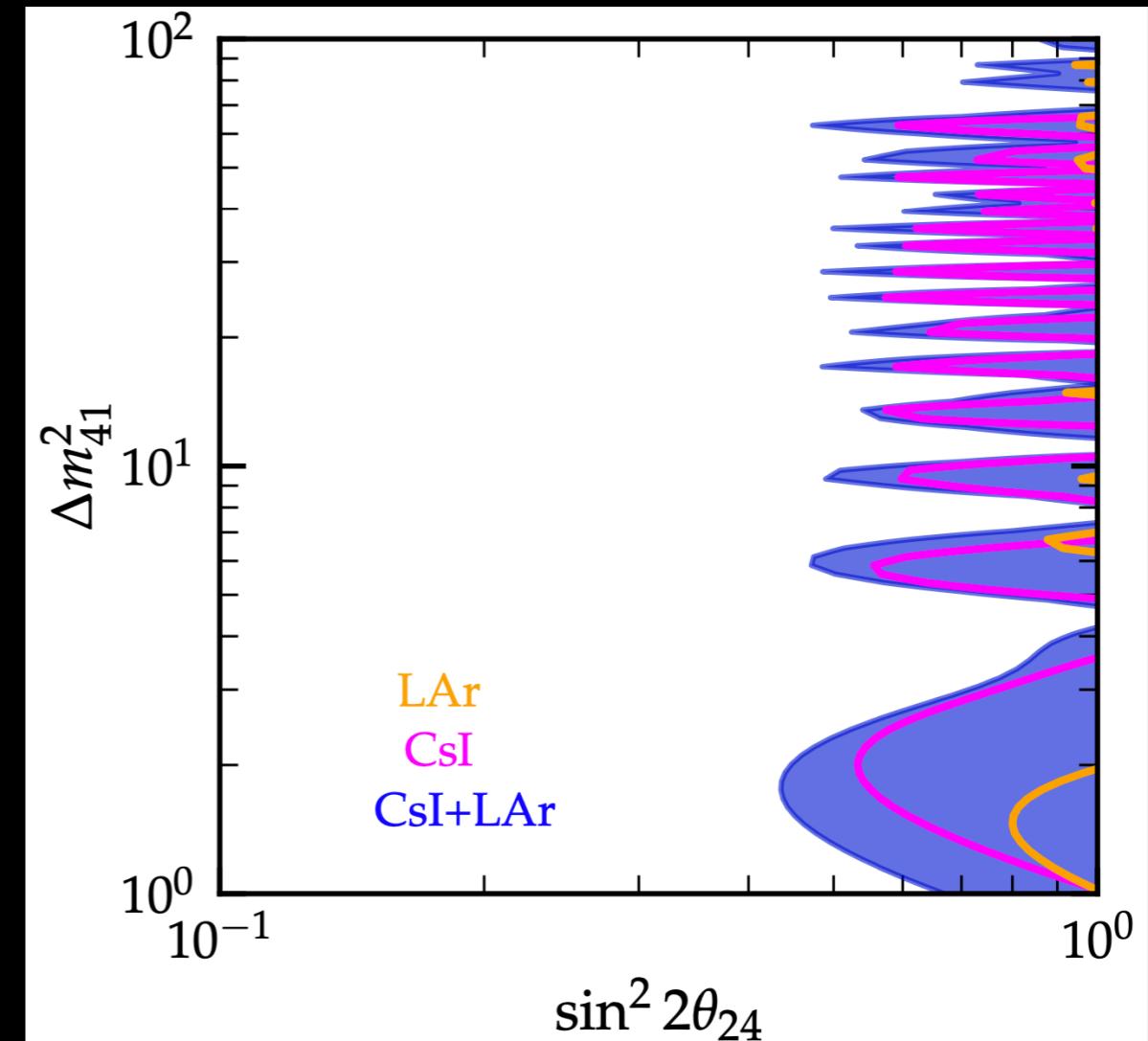
CEvNS' sensitivity to the total active neutrino flux \rightarrow search for sterile neutrinos.

$$P_{\mu\mu}(E_\nu) \simeq 1 - \sin^2 2\theta_{24} \sin^2 \left(\frac{\Delta m_{42}^2 L}{4E_\nu} \right)$$

$$P_{ee}(E_\nu) \simeq 1 - \sin^2 2\theta_{14} \sin^2 \left(\frac{\Delta m_{41}^2 L}{4E_\nu} \right)$$

This scenario leads to a slightly improved fit for the CsI data (compared to the SM), while for LAr it leads to a poorer result.

The sensitivity to the new mass splitting and active-sterile mixing angle is rather poor.



VDR, Miranda, Papoulias, Sanchez-García, Tórtola and Valle, 2211.11905 [hep-ph]

Summary

Scenario	SM	weak mixing angle ($\sin^2 \theta_W$)	nuclear neutron radius (R_n)	MM_{active} ($\mu_{\nu_e}, \mu_{\nu_\mu}$)
CsI	83.2 (0.849)	82.8 (0.854)	81.9 (0.845)	83.2 (0.867)
LAr	106.5 (0.887)	105.5 (0.887)	105.5 (0.887)	105.4 (0.893)
CsI+LAr	189.7 (0.870)	189.7 (0.874)	—	189.6 (0.877)
Scenario	NSI NU ($\epsilon_{ee}^{dV}, \epsilon_{ee}^{uV}$)	NSI NU ($\epsilon_{\mu\mu}^{dV}, \epsilon_{\mu\mu}^{uV}$)	NSI NU ($\epsilon_{ee}^{dV}, \epsilon_{\mu\mu}^{dV}$)	NSI NU ($\epsilon_{ee}^{uV}, \epsilon_{\mu\mu}^{uV}$)
CsI	82.9 (0.863)	82.9 (0.863)	82.8 (0.863)	82.8 (0.863)
LAr	105.7 (0.896)	105.6 (0.895)	105.5 (0.894)	105.5 (0.894)
CsI+LAr	188.9 (0.874)	188.5 (0.873)	188.9 (0.875)	188.5 (0.872)
Scenario	NSI FC ($\epsilon_{ee}^{dV}, \epsilon_{e\mu}^{dV}$)	NSI FC ($\epsilon_{\mu\mu}^{uV}, \epsilon_{e\mu}^{uV}$)	NSI FC ($\epsilon_{ee}^{dV}, \epsilon_{e\tau}^{dV}$)	NSI FC ($\epsilon_{\mu\mu}^{dV}, \epsilon_{\mu\tau}^{dV}$)
CsI	82.9 (0.863)	82.9 (0.863)	82.9 (0.863)	82.9 (0.863)
LAr	105.5 (0.894)	105.5 (0.894)	105.7 (0.896)	105.6 (0.895)
CsI+LAr	189.4 (0.877)	189.1 (0.876)	189.4 (0.877)	189.1 (0.876)
Scenario	NGI (V) (C_V^q)	NGI (S) (C_S^q)	NGI (T) (C_T^q)	
CsI	82.8 (0.854)	83.2 (0.858)	83.2 (0.858)	—
LAr	105.5 (0.887)	103.2 (0.867)	104.6 (0.879)	—
CsI+LAr	188.6 (0.869)	189.7 (0.874)	189.7 (0.874)	—
Scenario	NGI (V-T) (C_V^q, C_T^q)	NGI (V-S) (C_V^q, C_S^q)	NGI (S-T) (C_S^q, C_T^q)	
CsI	82.8 (0.863)	82.9 (0.863)	83.2 (0.867)	—
LAr	103.3 (0.875)	102.6 (0.870)	103.2 (0.874)	—
CsI+LAr	188.6 (0.873)	188.6 (0.873)	189.7 (0.878)	—
Scenario	LV universal (m_V, g_V)	LV B-L (m_V, g_V)	LS (m_S, g_S)	LT (m_T, g_T)
CsI	81.4 (0.848)	83.2 (0.867)	83.2 (0.867)	83.2 (0.867)
LAr	105.6 (0.895)	105.5 (0.894)	102.9 (0.872)	104.6 (0.887)
CsI+LAr	187.8 (0.869)	189.6 (0.878)	189.4 (0.877)	189.5 (0.877)
Scenario	millicharge ($q_{\nu_{ee}}, q_{\nu_{\mu\mu}}$)	charge radius ($\langle r_{\nu_{ee}}^2 \rangle, \langle r_{\nu_{\mu\mu}}^2 \rangle$)	TMM _{sterile} (m_4, μ_{ν_μ}) ^a	Sterile Osc. ($\sin^2 2\theta_{24}, \Delta m_{42}^2$)
CsI	83.2 (0.867)	82.8 (0.863)	83.2 (0.867)	82.1 (0.855)
LAr	106.4 (0.902)	105.5 (0.894)	105.1 (0.891)	106.5 (0.902)
CsI+LAr	189.7 (0.878)	188.4 (0.872)	189.5 (0.877)	188.6 (0.881)

► COHERENT data:

- We have analyzed the updated 2021 CsI data release from the COHERENT experiment and combined this result with the 2020 LAr data set.

► CEvNS physics potential on BSM scenarios:

- Neutrino generalized interactions
- New light mediators (V, S, T)
- Sterile dipole portal
- Sterile neutrino oscillations

► The inclusion of the recent CsI data significantly improves the CEvNS sensitivity in most of these physics cases.

► Wealth of information from forthcoming data: implications for both precision tests of the Standard Model and for new physics in the neutrino sector!

Summary

Scenario	SM	weak mixing angle ($\sin^2 \theta_W$)	nuclear neutron radius (R_n)	MM_{active} ($\mu_{\nu_e}, \mu_{\nu_\mu}$)
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Scenario	NSI NU ($\epsilon_{ee}^{dV}, \epsilon_{ee}^{uV}$)	NSI NU ($\epsilon_{\mu\mu}^{dV}, \epsilon_{\mu\mu}^{uV}$)	NSI NU ($\epsilon_{ee}^{dV}, \epsilon_{\mu\mu}^{dV}$)	NSI NU ($\epsilon_{ee}^{uV}, \epsilon_{\mu\mu}^{uV}$)
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Scenario	NSI FC ($\epsilon_{ee}^{dV}, \epsilon_{e\mu}^{dV}$)	NSI FC ($\epsilon_{\mu\mu}^{uV}, \epsilon_{e\mu}^{uV}$)	NSI FC ($\epsilon_{ee}^{dV}, \epsilon_{e\tau}^{dV}$)	NSI FC ($\epsilon_{\mu\mu}^{dV}, \epsilon_{\mu\tau}^{dV}$)
CsI	82.9 (0.863)	82.9 (0.863)	82.9 (0.863)	82.9 (0.863)
LAr	105.5 (0.894)	105.5 (0.894)	105.7 (0.896)	105.5 (0.895)
CsI+LAr	189.4 (0.877)	189.1 (0.876)	189.4 (0.877)	189.4 (0.876)
Scenario	NGI (V) (C_V^q)	NGI (S) (C_S^q)	NGI (T) (C_T^q)	—
CsI	82.8 (0.854)	83.2 (0.858)	83.2 (0.858)	—
LAr	105.5 (0.887)	103.2 (0.867)	104.6 (0.870)	—
CsI+LAr	188.6 (0.869)	189.7 (0.874)	189.7 (0.874)	—
Scenario	NGI (V-T) (C_V^q, C_T^q)	NGI (V-S) (C_V^q, C_S^q)	NGI (S-T) (C_S^q, C_T^q)	—
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LAr	103.3 (0.875)	102.6 (0.870)	103.2 (0.874)	—
CsI+LAr	188.6 (0.873)	188.6 (0.873)	189.7 (0.878)	—
Scenario	LV universal (m_V, g_V)	LV B-L (m_V, g_V)	LS (m_S, g_S)	LT (m_T, g_T)
CsI	81.4 (0.848)	83.2 (0.867)	83.2 (0.867)	83.2 (0.867)
LAr	105.6 (0.895)	105.5 (0.894)	102.9 (0.872)	104.6 (0.887)
CsI+LAr	187.8 (0.869)	189.6 (0.878)	189.4 (0.877)	189.5 (0.877)
Scenario	millicharge ($q_{\nu_{ee}}, q_{\nu_{\mu\mu}}$)	charge radius ($\langle r_{\nu_{ee}}^2 \rangle, \langle r_{\nu_{\mu\mu}}^2 \rangle$)	TMM _{sterile} (m_4, μ_{ν_μ}) ^a	Sterile Osc. ($\sin^2 2\theta_{24}, \Delta m_{42}^2$)
CsI	83.2 (0.867)	82.8 (0.863)	83.2 (0.867)	82.1 (0.855)
LAr	106.4 (0.902)	105.5 (0.894)	105.1 (0.891)	106.5 (0.902)
CsI+LAr	189.7 (0.878)	188.4 (0.872)	189.5 (0.877)	188.6 (0.881)

► COHERENT data:

- We have analyzed the updated 2021 CsI data release from the COHERENT experiment and combined this result with the 2020 LAr data set.

► CEvNS precision potential on BSM scenarios:

- Emerging generalized interactions

New light mediators (V, S, T)

- Sterile dipole moment

- Sterile neutrino oscillations

► The inclusion of the recent CsI data significantly improves the CEvNS sensitivity in most of these physics cases.

► Wealth of information from forthcoming data:

implications for both precision tests of the Standard Model and for new physics in the neutrino sector!