

References for AxionLimits webpage

Ciaran A. J. O'Hare

ARC Centre of Excellence for Dark Matter Particle Physics
The University of Sydney, Camperdown, NSW 2006, Australia

1 Axion-photon

Haloscopes

- ABRACADABRA [1, 2]
- ADMX [3, 4, 5, 6]
- ADMX-Sidecar [7, 8]
- ADMX-SLIC [9]
- CAPP [10, 11, 12]
- BASE [13]
- GrAHal [14]
- HAYSTAC [15, 16]
- ORGAN [17]
- QUAX [18, 19]
- RADES [20]
- RBF [21]
- SHAFT [22]
- UF [23]
- UPLOAD-DOWNLOAD [24]
- ABRACADABRA (projection) [25]
- ADBC (projection) [26]
- ADMX (projection) [27]
- aLIGO (projection) [28]
- ALPHA (projection) [29]
- BRASS (projection) [30]
- DM-Radio (projection) [31]
- DANCE (projection) [32]
- LAMPOST (projection) [33]
- MADMAX (projection) [34]
- KLASH (projection) [35]
- ORGAN (projection) [17]
- TOORAD (projection) [36]
- WISPLC (projection) [37]

LSW/Helioscopes

- ALPS [38]
- CAST [39, 40]
- CROWS [41]
- OSQAR [42]
- PVLAS [43]
- SAPPHIRES [44]
- ALPS-II (projection) [45]
- IAXO (projection) [46]
- IAXO (Galactic SN) [47]

Astro

- Bullet Cluster (archival radio data) [48]
- Chandra (Hydra) [49]
- Chandra (M87) [50]
- Chandra (NGC 1275) [51]
- Chandra (H1821+643) [52]
- Chandra (Magnetic white dwarfs) [52]
- Diffuse SN ALPs [53] (see also [54])
- Distance ladder [55]
- Fermi-LAT (NGC 1275) [56]
- Fermi-LAT (Extragalactic SNe) [57]
- HESS (PKS 2155-304) [58]
- Horizontal branch [59]
- Mrk 421 (ARGO-YBJ+Fermi): [60]
- Neutron Stars (Foster et al.) [61]
- Neutron Stars (Darling) [62]
- Neutron Stars (Battye et al.) [63]
- Solar neutrinos [64]
- SN1987A- γ [65]
- SN1987A- γ (low mass ALPs) [66]
- SN1987A- γ, ν (high mass ALPs) [67]
- Star clusters [68]
- Telescopes (Haystack) [69]
- Telescopes (MUSE) [70]
- Telescopes (VIMOS) [71]
- Fermi galactic SN (projection) [72]
- THESEUS (projection) [73]
- eROSITA (projection) [74]
- White dwarf initial-final mass relation [75]
- XMM-Newton (decaying DM ALPs) [76]

Cosmology

- Ionisation fraction, EBL, X-rays [77]
- BBN+ N_{eff} [78]

2 Axion-electron

- EDELWEISS [79]
- Magnon non-demolition [80]
- LUX [81]
- Panda-X [82]
- SuperCDMS [83]
- XENON1T [84, 85]
- XENON1T (Solar basin) [86]
- Red giants (ω Cen) [87]
- Solar neutrinos [88]
- Magnons (projection) [89]
- Polaritons (projection) [90]
- DARWIN (projection) [91]
- LZ (projection) [92]
- QUAX [93, 94]
- Semiconductors (projection) [95]
- White dwarf hint [96]

3 Axion-nucleon

Note: CASPER and nEDM limits account for stochastic correction reported in [97]

- CASPER-ZULF-Comagnetometer [98]
- CASPER-ZULF-Sidechain [99]
- nEDM (ultracold neutrons and mercury) [100]
- NASDUCK [101]
- K-3He comagnetometer [102]
- Old comagnetometers [103]
- Torsion balance [104]
- Hot Neutron Star (HESS J1731-347) [105]
- SN1987A Cooling [106]
- SNO (deuterium dissasociation) [107]
- Proton storage ring (projection) [108]
- DM comagnetometer (projection) [103]
- CASPER-wind (projection) [99]

4 Axion-EDM

- CASPER-electric [109]
- nEDM [100]
- SN1987A [110]
- CASPER-electric (projection) [111]
- Storage Ring EDM (projection) [111]

5 Axion mass versus f_a

- BBN [112]
- Binary pulsars and Solar core constraint on $\bar{\theta}$ [113]. I include minor numerical corrections made by [114, 115].
- GW170817 [116]
- nEDM [100]
- SN1987A [117]
- Neutron stars (projection) [113].
- NS-NS and NS-BH Inspirals (projection) [113].

6 Axion theory predictions

6.1 Post-inflation QCD axion

- Ballesteros et al. [118]
- Buschmann et al. 2020 [119]
- Buschmann et al. 2021 [120]
- Bonati et al. [121]
- Borsanyi et al. [122]
- Berkowitz et al. [123]
- Dine et al. [124]
- Petreczky et al. [125]
- Fleury & Moore [126]
- Klaer & Moore [127]

6.2 Other dark matter predictions

- ALP Cogenesis [128]
- Early matter domination [129]
- Post-inflation ALP misalignment [130]
- Trapped misalignment (\mathcal{Z}_N axion) [114]

7 CP-violating couplings

Combined constraints [131]

Scalar-nucleon

- Red giants [132]
- MICROSCOPE [133].
- Eot-Wash [134, 135, 136]
- Irvine [137]. Corrected to 2σ limit by [138]
- HUST [139, 140, 141, 142].
- Stanford [143]
- IUPUI [144].
- Wuhan [138]

Pseudoscalar-electron

- Red giants [132]
- Eot-wash [145]
- NIST [146]
- SMILE [147].
- QUAX [148, 149]
- Washington [150, 151].
- XENON1T [152]
- Magnon (projection) [90]
- QUAX (projection) [148].

Pseudoscalar-nucleon

- Neutron star cooling [105]
- Washington [153]. Limit taken from [154].
- SMILE [147].
- Mainz [155]
- ARIADNE (projection) [156]
- CASPER-wind (projection) [111]
- DM comagnetometer (projection) [103]

8 Black hole superradiance

- Baryakhtar et al. [157] (just Stellar mass BHs)
- Mehta et al. [157] (Stellar mass and SMBHs)
- Stott [158]
- Cardoso et al. [159] (dark photon)

9 Dark photons

Combined constraints [160]

SM photon-DP transitions

- Coulomb [161, 162, 163, 164, 165],
- Plimpton & Lawton's experiment [166, 165]
- Atomic spectroscopy [167]
- Atomic force microscopy (AFM) [165]
- Static magnetic field of the Earth [168, 169]
- Static magnetic field of Jupiter [170, 169].
- ALPs [38]
- SPring-8 [171]
- UWA-LSW [172, 173]
- ADMX-LSW [174]
- CROWS [41].
- TEXONO [175]
- Crab nebula [176]
- COBE and FIRAS [177]

Production in stars

- CAST [178]
- SHIP [179]
- HB and RG stars [180]
- Neutron stars [181]
- Solar neutrinos [182]

Dark matter cosmology/astro

- Arias et al. [130]
- Witte et al. [183, 184]
- Caputo et al. [185, 177],
- IGM [186],
- Leo T dwarf [187]
- Gas clouds [188]

Dark matter experiments

- Reinterpreted axion limits [160]
- DAMIC [189]
- Dark E-field Radio [190]
- DM Pathfinder [191]
- FUNK [192]
- LAMPOST [193]
- MuDHI [194]
- SENSEI [195]
- SHUKET [196]
- SuperCDMS [197]
- SuperMAG [198, 199]
- SQuAD [200],
- Tokyo dish antennae experiments [201, 202, 203]
- WISPDMS [204]
- XENON1T/XENON100 [95, 152, 205, 206].

References

- [1] J. L. Ouellet et al., *First Results from ABRACADABRA-10 cm: A Search for Sub- μeV Axion Dark Matter*, *Phys. Rev. Lett.* **122** (2019) 121802 [[1810.12257](#)].
- [2] C. P. Salemi et al., *Search for Low-Mass Axion Dark Matter with ABRACADABRA-10 cm*, *Phys. Rev. Lett.* **127** (2021) 081801 [[2102.06722](#)].
- [3] S. J. Asztalos, G. Carosi, C. Hagmann, D. Kinion, K. van Bibber, M. Hotz, L. J. Rosenberg, G. Rybka, J. Hoskins, J. Hwang, P. Sikivie, D. B. Tanner, R. Bradley, J. Clarke and ADMX Collaboration, *SQUID-Based Microwave Cavity Search for Dark-Matter Axions*, *Phys. Rev. Lett.* **104** (2010) 041301 [[0910.5914](#)].
- [4] ADMX Collaboration, N. Du et al., *A Search for Invisible Axion Dark Matter with the Axion Dark Matter Experiment*, *Phys. Rev. Lett.* **120** (2018) 151301 [[1804.05750](#)].
- [5] ADMX Collaboration, T. Braine et al., *Extended Search for the Invisible Axion with the Axion Dark Matter Experiment*, *Phys. Rev. Lett.* **124** (2020) 101303 [[1910.08638](#)].
- [6] ADMX Collaboration, C. Bartram et al., *Search for “Invisible” Axion Dark Matter in the 3.3–4.2 μeV Mass Range*, [2110.06096](#).
- [7] ADMX Collaboration, C. Boutan et al., *Piezoelectrically Tuned Multimode Cavity Search for Axion Dark Matter*, *Phys. Rev. Lett.* **121** (2018) 261302 [[1901.00920](#)].
- [8] C. Bartram et al., *Dark Matter Axion Search Using a Josephson Traveling Wave Parametric Amplifier*, [2110.10262](#).
- [9] N. Crisosto, P. Sikivie, N. S. Sullivan, D. B. Tanner, J. Yang and G. Rybka, *ADMX SLIC: Results from a Superconducting LC Circuit Investigating Cold Axions*, *Phys. Rev. Lett.* **124** (2020) 241101 [[1911.05772](#)].
- [10] S. Lee, S. Ahn, J. Choi, B. R. Ko and Y. K. Semertzidis, *Axion Dark Matter Search around 6.7 μeV* , *Phys. Rev. Lett.* **124** (2020) 101802 [[2001.05102](#)].
- [11] J. Jeong, S. Youn, S. Bae, J. Kim, T. Seong, J. E. Kim and Y. K. Semertzidis, *Search for Invisible Axion Dark Matter with a Multiple-Cell Haloscope*, *Phys. Rev. Lett.* **125** (2020) 221302 [[2008.10141](#)].
- [12] CAPP Collaboration, O. Kwon et al., *First Results from an Axion Haloscope at CAPP around 10.7 μeV* , *Phys. Rev. Lett.* **126** (2021) 191802 [[2012.10764](#)].
- [13] J. A. Devlin et al., *Constraints on the Coupling between Axionlike Dark Matter and Photons Using an Antiproton Superconducting Tuned Detection Circuit in a Cryogenic Penning Trap*, *Phys. Rev. Lett.* **126** (2021) 041301 [[2101.11290](#)].
- [14] T. Grenet, R. Ballou, Q. Basto, K. Martineau, P. Perrier, P. Pagnat, J. Quevillon, N. Roch and C. Smith, *The Grenoble Axion Haloscope platform (GrAHal): development plan and first results*, [2110.14406](#).
- [15] HAYSTAC Collaboration, L. Zhong et al., *Results from phase 1 of the HAYSTAC microwave cavity axion experiment*, *Phys. Rev. D* **97** (2018) 092001 [[1803.03690](#)].
- [16] HAYSTAC Collaboration, K. M. Backes et al., *A quantum-enhanced search for dark matter axions*, *Nature* **590** (2021) 238 [[2008.01853](#)].
- [17] B. T. McAllister, G. Flower, E. N. Ivanov, M. Goryachev, J. Bourhill and M. E. Tobar, *The ORGAN Experiment: An axion haloscope above 15 GHz*, *Phys. Dark Univ.* **18** (2017) 67 [[1706.00209](#)].
- [18] D. Alesini et al., *Galactic axions search with a superconducting resonant cavity*, *Phys. Rev. D* **99** (2019) 101101 [[1903.06547](#)].
- [19] D. Alesini et al., *Search for invisible axion dark matter of mass $m_a = 43 \mu\text{eV}$ with the QUAX- $\alpha\gamma$ experiment*, *Phys. Rev. D* **103** (2021) 102004 [[2012.09498](#)].
- [20] CAST Collaboration, A. A. Melcón et al., *First results of the CAST-RADES haloscope search for axions at 34.67 μeV* , [2104.13798](#).

- [21] S. DePanfilis, A. C. Melissinos, B. E. Moskowitz, J. T. Rogers, Y. K. Semertzidis, W. U. Wuensch, H. J. Halama, A. G. Prodel, W. B. Fowler and F. A. Nezrick, *Limits on the abundance and coupling of cosmic axions at $4.5 < m_a < 5.0 \mu\text{ev}$* , *Phys. Rev. Lett.* **59** (1987) 839.
- [22] A. V. Gramolin, D. Aybas, D. Johnson, J. Adam and A. O. Sushkov, *Search for axion-like dark matter with ferromagnets*, *Nature Phys.* **17** (2021) 79 [2003.03348].
- [23] C. Hagmann, P. Sikivie, N. S. Sullivan and D. B. Tanner, *Results from a search for cosmic axions*, *Phys. Rev. D* **42** (1990) 1297.
- [24] C. A. Thomson, B. T. McAllister, M. Goryachev, E. N. Ivanov and M. E. Tobar, *Upconversion Loop Oscillator Axion Detection Experiment: A Precision Frequency Interferometric Axion Dark Matter Search with a Cylindrical Microwave Cavity*, *Phys. Rev. Lett.* **126** (2021) 081803 [1912.07751]. [Erratum: *Phys.Rev.Lett.* 127, 019901 (2021)].
- [25] *Abracadabra*, <https://abracadabra.mit.edu/>.
- [26] H. Liu, B. D. Elwood, M. Evans and J. Thaler, *Searching for Axion Dark Matter with Birefringent Cavities*, *Phys. Rev. D* **100** (2019) 023548 [1809.01656].
- [27] I. Stern, *ADMX Status*, *PoS ICHEP2016* (2016) 198 [1612.08296].
- [28] K. Nagano, T. Fujita, Y. Michimura and I. Obata, *Axion Dark Matter Search with Interferometric Gravitational Wave Detectors*, *Phys. Rev. Lett.* **123** (2019) 111301 [1903.02017].
- [29] M. Lawson, A. J. Millar, M. Pancaldi, E. Vitagliano and F. Wilczek, *Tunable axion plasma haloscopes*, *Phys. Rev. Lett.* **123** (2019) 141802 [1904.11872].
- [30] *Brass*, <https://www1.physik.uni-hamburg.de/iexp/gruppe-horns/forschung/brass.html>.
- [31] *Dmradio*, https://indico.mit.edu/event/151/contributions/295/attachments/96/172/Dark%20Matter%20Radio_CambridgeAxions2021.pdf.
- [32] Y. Michimura, Y. Oshima, T. Watanabe, T. Kawasaki, H. Takeda, M. Ando, K. Nagano, I. Obata and T. Fujita, *DANCE: Dark matter Axion search with riNg Cavity Experiment*, *J. Phys. Conf. Ser.* **1468** (2020) 012032 [1911.05196].
- [33] M. Baryakhtar, J. Huang and R. Lasenby, *Axion and hidden photon dark matter detection with multilayer optical haloscopes*, *Phys. Rev. D* **98** (2018) 035006 [1803.11455].
- [34] S. Beurthey et al., *MADMAX Status Report*, 2003.10894.
- [35] D. Alesini, D. Babusci, D. Di Gioacchino, C. Gatti, G. Lamanna and C. Ligi, *The KLASH Proposal*, 1707.06010.
- [36] J. Schütte-Engel, D. J. E. Marsh, A. J. Millar, A. Sekine, F. Chadha-Day, S. Hoof, M. N. Ali, K.-C. Fong, E. Hardy and L. Šmejkal, *Axion quasiparticles for axion dark matter detection*, *JCAP* **08** (2021) 066 [2102.05366].
- [37] Z. Zhang, O. Ghosh and D. Horns, *WISPLC: Search for Dark Matter with LC Circuit*, 2111.04541.
- [38] K. Ehret et al., *New ALPS Results on Hidden-Sector Lightweights*, *Phys. Lett. B* **689** (2010) 149 [1004.1313].
- [39] CAST Collaboration, S. Andriamonje et al., *An Improved limit on the axion-photon coupling from the CAST experiment*, *JCAP* **04** (2007) 010 [hep-ex/0702006].
- [40] CAST Collaboration, V. Anastassopoulos et al., *New CAST Limit on the Axion-Photon Interaction*, *Nature Phys.* **13** (2017) 584 [1705.02290].
- [41] M. Betz, F. Caspers, M. Gasior, M. Thumm and S. W. Rieger, *First results of the CERN Resonant Weakly Interacting sub-eV Particle Search (CROWS)*, *Phys. Rev. D* **88** (2013) 075014 [1310.8098].
- [42] OSQAR Collaboration, R. Ballou et al., *New exclusion limits on scalar and pseudoscalar axionlike particles from light shining through a wall*, *Phys. Rev. D* **92** (2015) 092002 [1506.08082].

- [43] F. Della Valle, A. Ejlli, U. Gastaldi, G. Messineo, E. Milotti, R. Pengo, G. Ruoso and G. Zavattini, *The PVLAS experiment: measuring vacuum magnetic birefringence and dichroism with a birefringent Fabry–Perot cavity*, *Eur. Phys. J. C* **76** (2016) 24 [[1510.08052](#)].
- [44] SAPPHIRES Collaboration, K. Homma et al., *Search for sub-eV axion-like resonance states via stimulated quasi-parallel laser collisions with the parameterization including fully asymmetric collisional geometry*, [2105.01224](#).
- [45] M. D. Ortiz et al., *Design of the ALPS II Optical System*, [2009.14294](#).
- [46] I. Shilon, A. Dudarev, H. Silva, U. Wagner and H. H. J. ten Kate, *The Superconducting Toroid for the New International AXion Observatory (IAXO)*, *IEEE Trans. Appl. Supercond.* **24** (2014) 4500104 [[1309.2117](#)].
- [47] S.-F. Ge, K. Hamaguchi, K. Ichimura, K. Ishidoshiro, Y. Kanazawa, Y. Kishimoto, N. Nagata and J. Zheng, *Supernova-scope for the Direct Search of Supernova Axions*, *JCAP* **11** (2020) 059 [[2008.03924](#)].
- [48] M. H. Chan, *Constraining the axion-photon coupling using radio data of the Bullet Cluster*, [2109.11734](#).
- [49] D. Wouters and P. Brun, *Constraints on Axion-like Particles from X-Ray Observations of the Hydra Galaxy Cluster*, *Astrophys. J.* **772** (2013) 44 [[1304.0989](#)].
- [50] M. C. D. Marsh, H. R. Russell, A. C. Fabian, B. P. McNamara, P. Nulsen and C. S. Reynolds, *A New Bound on Axion-Like Particles*, *JCAP* **12** (2017) 036 [[1703.07354](#)].
- [51] C. S. Reynolds, M. C. D. Marsh, H. R. Russell, A. C. Fabian, R. Smith, F. Tombesi and S. Veilleux, *Astrophysical Limits on Very Light Axion-like Particles from Chandra Grating Spectroscopy of NGC 1275*, *Astrophys. J.* **890** (2020) 59 [[1907.05475](#)].
- [52] J. S. Reynés, J. H. Matthews, C. S. Reynolds, H. R. Russell, R. N. Smith and M. C. D. Marsh, *New constraints on light Axion-Like Particles using Chandra Transmission Grating Spectroscopy of the powerful cluster-hosted quasar H1821+643*, [2109.03261](#).
- [53] F. Calore, P. Carenza, C. Eckner, T. Fischer, M. Giannotti, J. Jaeckel, K. Kotake, T. Kuroda, A. Mirizzi and F. Sivo, *3D template-based Fermi-LAT constraints on axion-like particles*, [2110.03679](#).
- [54] F. Calore, P. Carenza, M. Giannotti, J. Jaeckel and A. Mirizzi, *Bounds on axionlike particles from the diffuse supernova flux*, *Phys. Rev. D* **102** (2020) 123005 [[2008.11741](#)].
- [55] M. A. Buen-Abad, J. Fan and C. Sun, *Constraints on Axions from Cosmic Distance Measurements*, [2011.05993](#).
- [56] FERMI-LAT Collaboration, M. Ajello et al., *Search for Spectral Irregularities due to Photon–Axionlike-Particle Oscillations with the Fermi Large Area Telescope*, *Phys. Rev. Lett.* **116** (2016) 161101 [[1603.06978](#)].
- [57] M. Meyer and T. Petrushevskaya, *Search for Axionlike-Particle-Induced Prompt γ -Ray Emission from Extragalactic Core-Collapse Supernovae with the Fermi Large Area Telescope*, *Phys. Rev. Lett.* **124** (2020) 231101 [[2006.06722](#)]. [Erratum: *Phys.Rev.Lett.* 125, 119901 (2020)].
- [58] H.E.S.S. Collaboration, A. Abramowski et al., *Constraints on axionlike particles with H.E.S.S. from the irregularity of the PKS 2155-304 energy spectrum*, *Phys. Rev. D* **88** (2013) 102003 [[1311.3148](#)].
- [59] A. Ayala, I. Domínguez, M. Giannotti, A. Mirizzi and O. Straniero, *Revisiting the bound on axion-photon coupling from Globular Clusters*, *Phys. Rev. Lett.* **113** (2014) 191302 [[1406.6053](#)].
- [60] H.-J. Li, J.-G. Guo, X.-J. Bi, S.-J. Lin and P.-F. Yin, *Limits on axionlike particles from Mrk 421 with 4.5-year period observations by ARGO-YBJ and Fermi-LAT*, *Phys. Rev. D* **103** (2021) 083003 [[2008.09464](#)].
- [61] J. W. Foster, Y. Kahn, O. Macias, Z. Sun, R. P. Eatough, V. I. Kondratiev, W. M. Peters, C. Weniger and B. R. Safdi, *Green Bank and Effelsberg Radio Telescope Searches for Axion Dark Matter Conversion in Neutron Star Magnetospheres*, *Phys. Rev. Lett.* **125** (2020) 171301 [[2004.00011](#)].
- [62] J. Darling, *New Limits on Axionic Dark Matter from the Magnetar PSR J1745-2900*, *Astrophys. J. Lett.* **900** (2020) L28 [[2008.11188](#)].

- [63] R. A. Battye, J. Darling, J. McDonald and S. Srinivasan, *Towards Robust Constraints on Axion Dark Matter using PSR J1745-2900*, [2107.01225](#).
- [64] N. Vinyoles, A. Serenelli, F. L. Villante, S. Basu, J. Redondo and J. Isern, *New axion and hidden photon constraints from a solar data global fit*, *JCAP* **2015** (2015) 015 [[1501.01639](#)].
- [65] J. Jaeckel, P. C. Malta and J. Redondo, *Decay photons from the axionlike particles burst of type II supernovae*, *Phys. Rev. D* **98** (2018) 055032 [[1702.02964](#)].
- [66] A. Payez, C. Evoli, T. Fischer, M. Giannotti, A. Mirizzi and A. Ringwald, *Revisiting the SN1987A gamma-ray limit on ultralight axion-like particles*, *JCAP* **02** (2015) 006 [[1410.3747](#)].
- [67] A. Caputo, G. Raffelt and E. Vitagliano, *Muonic Boson Limits: Supernova Redux*, [2109.03244](#).
- [68] C. Dessert, J. W. Foster and B. R. Safdi, *X-ray Searches for Axions from Super Star Clusters*, *Phys. Rev. Lett.* **125** (2020) 261102 [[2008.03305](#)].
- [69] B. D. Blout, E. J. Daw, M. P. Decowski, P. T. P. Ho, L. J. Rosenberg and D. B. Yu, *A Radio telescope search for axions*, *Astrophys. J.* **546** (2001) 825 [[astro-ph/0006310](#)].
- [70] M. Regis, M. Taoso, D. Vaz, J. Brinchmann, S. L. Zoutendijk, N. F. Bouché and M. Steinmetz, *Searching for light in the darkness: Bounds on ALP dark matter with the optical MUSE-faint survey*, *Phys. Lett. B* **814** (2021) 136075 [[2009.01310](#)].
- [71] D. Grin, G. Covone, J.-P. Kneib, M. Kamionkowski, A. Blain and E. Jullo, *A Telescope Search for Decaying Relic Axions*, *Phys. Rev. D* **75** (2007) 105018 [[astro-ph/0611502](#)].
- [72] M. Meyer, M. Giannotti, A. Mirizzi, J. Conrad and M. A. Sánchez-Conde, *Fermi Large Area Telescope as a Galactic Supernovae Axionscope*, *Phys. Rev. Lett.* **118** (2017) 011103 [[1609.02350](#)].
- [73] C. Thorpe-Morgan, D. Malyshev, A. Santangelo, J. Jochum, B. Jäger, M. Sasaki and S. Saeedi, *THESEUS insights into axionlike particles, dark photon, and sterile neutrino dark matter*, *Phys. Rev. D* **102** (2020) 123003 [[2008.08306](#)].
- [74] A. Dekker, E. Peerbooms, F. Zimmer, K. C. Y. Ng and S. Ando, *Searches for sterile neutrinos and axionlike particles from the Galactic halo with eROSITA*, *Phys. Rev. D* **104** (2021) 023021 [[2103.13241](#)].
- [75] M. J. Dolan, F. J. Hiskens and R. R. Volkas, *Constraining axion-like particles using the white dwarf initial-final mass relation*, *JCAP* **09** (2021) 010 [[2102.00379](#)].
- [76] J. W. Foster, M. Kongsore, C. Dessert, Y. Park, N. L. Rodd, K. Cranmer and B. R. Safdi, *Deep Search for Decaying Dark Matter with XMM-Newton Blank-Sky Observations*, *Phys. Rev. Lett.* **127** (2021) 051101 [[2102.02207](#)].
- [77] D. Cadamuro and J. Redondo, *Cosmological bounds on pseudo Nambu-Goldstone bosons*, *JCAP* **02** (2012) 032 [[1110.2895](#)].
- [78] P. F. Depta, M. Hufnagel and K. Schmidt-Hoberg, *Robust cosmological constraints on axion-like particles*, *JCAP* **05** (2020) 009 [[2002.08370](#)].
- [79] EDELWEISS Collaboration, E. Armengaud et al., *Searches for electron interactions induced by new physics in the EDELWEISS-III Germanium bolometers*, *Phys. Rev. D* **98** (2018) 082004 [[1808.02340](#)].
- [80] T. Ikeda, A. Ito, K. Miuchi, J. Soda, H. Kurashige and Y. Shikano, *Axion search with quantum nondemolition detection of magnons*, [2102.08764](#).
- [81] LUX Collaboration, D. S. Akerib et al., *First Searches for Axions and Axionlike Particles with the LUX Experiment*, *Phys. Rev. Lett.* **118** (2017) 261301 [[1704.02297](#)].
- [82] PANDAX Collaboration, C. Fu et al., *Limits on Axion Couplings from the First 80 Days of Data of the PandaX-II Experiment*, *Phys. Rev. Lett.* **119** (2017) 181806 [[1707.07921](#)].
- [83] SUPERCDMS Collaboration, T. Aralis et al., *Constraints on dark photons and axionlike particles from the SuperCDMS Soudan experiment*, *Phys. Rev. D* **101** (2020) 052008 [[1911.11905](#)]. [Erratum: *Phys. Rev. D* **103**, 039901 (2021)].
- [84] XENON Collaboration, E. Aprile et al., *Light Dark Matter Search with Ionization Signals in XENON1T*, *Phys. Rev. Lett.* **123** (2019) 251801 [[1907.11485](#)].

- [85] XENON Collaboration, E. Aprile et al., *Excess electronic recoil events in XENON1T*, *Phys. Rev. D* **102** (2020) 072004 [2006.09721].
- [86] K. Van Tilburg, *Stellar basins of gravitationally bound particles*, *Phys. Rev. D* **104** (2021) 023019 [2006.12431].
- [87] F. Capozzi and G. Raffelt, *Axion and neutrino bounds improved with new calibrations of the tip of the red-giant branch using geometric distance determinations*, *Phys. Rev. D* **102** (2020) 083007 [2007.03694].
- [88] P. Gondolo and G. G. Raffelt, *Solar neutrino limit on axions and keV-mass bosons*, *Phys. Rev. D* **79** (2009) 107301 [0807.2926].
- [89] S. Chigusa, T. Moroi and K. Nakayama, *Detecting light boson dark matter through conversion into a magnon*, *Phys. Rev. D* **101** (2020) 096013 [2001.10666].
- [90] A. Mitridate, T. Trickle, Z. Zhang and K. M. Zurek, *Detectability of Axion Dark Matter with Phonon Polaritons and Magnons*, *Phys. Rev. D* **102** (2020) 095005 [2005.10256].
- [91] DARWIN Collaboration, J. Aalbers et al., *DARWIN: towards the ultimate dark matter detector*, *JCAP* **11** (2016) 017 [1606.07001].
- [92] LZ Collaboration, D. S. Akerib et al., *Projected sensitivities of the LUX-ZEPLIN (LZ) experiment to new physics via low-energy electron recoils*, *2102.11740*.
- [93] N. Crescini et al., *Operation of a ferromagnetic axion haloscope at $m_a = 58 \mu\text{eV}$* , *Eur. Phys. J. C* **78** (2018) 703 [1806.00310]. [Erratum: *Eur.Phys.J.C* 78, 813 (2018)].
- [94] QUAX Collaboration, N. Crescini et al., *Axion search with a quantum-limited ferromagnetic haloscope*, *Phys. Rev. Lett.* **124** (2020) 171801 [2001.08940].
- [95] I. M. Bloch, R. Essig, K. Tobioka, T. Volansky and T.-T. Yu, *Searching for Dark Absorption with Direct Detection Experiments*, *JHEP* **06** (2017) 087 [1608.02123].
- [96] M. Giannotti, I. G. Irastorza, J. Redondo, A. Ringwald and K. Saikawa, *Stellar Recipes for Axion Hunters*, *JCAP* **10** (2017) 010 [1708.02111].
- [97] G. P. Centers et al., *Stochastic fluctuations of bosonic dark matter*, *1905.13650*.
- [98] T. Wu et al., *Search for Axionlike Dark Matter with a Liquid-State Nuclear Spin Comagnetometer*, *Phys. Rev. Lett.* **122** (2019) 191302 [1901.10843].
- [99] A. Garcon et al., *Constraints on bosonic dark matter from ultralow-field nuclear magnetic resonance*, *Sci. Adv.* **5** (2019) eaax4539 [1902.04644].
- [100] C. Abel et al., *Search for Axionlike Dark Matter through Nuclear Spin Precession in Electric and Magnetic Fields*, *Phys. Rev. X* **7** (2017) 041034 [1708.06367].
- [101] I. M. Bloch, G. Ronen, R. Shaham, O. Katz, T. Volansky and O. Katz, *NASDUCK: New Constraints on Axion-like Dark Matter from Floquet Quantum Detector*, *2105.04603*.
- [102] G. Vasilakis, J. M. Brown, T. W. Kornack and M. V. Romalis, *Limits on New Long Range Nuclear Spin-Dependent Forces Set with a K-He3 Comagnetometer*, *Phys. Rev. Lett.* **103** (2009) 261801 [0809.4700].
- [103] I. M. Bloch, Y. Hochberg, E. Kuflik and T. Volansky, *Axion-like Relics: New Constraints from Old Comagnetometer Data*, *JHEP* **01** (2020) 167 [1907.03767].
- [104] E. G. Adelberger, B. R. Heckel, S. A. Hoedl, C. D. Hoyle, D. J. Kapner and A. Upadhye, *Particle Physics Implications of a Recent Test of the Gravitational Inverse Square Law*, *Phys. Rev. Lett.* **98** (2007) 131104 [hep-ph/0611223].
- [105] M. V. Beznogov, E. Rrapaj, D. Page and S. Reddy, *Constraints on Axion-like Particles and Nucleon Pairing in Dense Matter from the Hot Neutron Star in HESS J1731-347*, *Phys. Rev. C* **98** (2018) 035802 [1806.07991].
- [106] P. Carenza, T. Fischer, M. Giannotti, G. Guo, G. Martínez-Pinedo and A. Mirizzi, *Improved axion emissivity from a supernova via nucleon-nucleon bremsstrahlung*, *JCAP* **10** (2019) 016 [1906.11844]. [Erratum: *JCAP* 05, E01 (2020)].

- [107] A. Bhusal, N. Houston and T. Li, *Searching for Solar Axions Using Data from the Sudbury Neutrino Observatory*, *Phys. Rev. Lett.* **126** (2021) 091601 [[2004.02733](#)].
- [108] P. W. Graham, S. Hacıömeroğlu, D. E. Kaplan, Z. Omarov, S. Rajendran and Y. K. Semertzidis, *Storage ring probes of dark matter and dark energy*, *Phys. Rev. D* **103** (2021) 055010 [[2005.11867](#)].
- [109] D. Aybas et al., *Search for Axionlike Dark Matter Using Solid-State Nuclear Magnetic Resonance*, *Phys. Rev. Lett.* **126** (2021) 141802 [[2101.01241](#)].
- [110] P. W. Graham and S. Rajendran, *New Observables for Direct Detection of Axion Dark Matter*, *Phys. Rev. D* **88** (2013) 035023 [[1306.6088](#)].
- [111] D. F. Jackson Kimball et al., *Overview of the Cosmic Axion Spin Precession Experiment (CASPER)*, *Springer Proc. Phys.* **245** (2020) 105 [[1711.08999](#)].
- [112] K. Blum, R. T. D’Agnolo, M. Lisanti and B. R. Safdi, *Constraining Axion Dark Matter with Big Bang Nucleosynthesis*, *Phys. Lett. B* **737** (2014) 30 [[1401.6460](#)].
- [113] A. Hook and J. Huang, *Probing axions with neutron star inspirals and other stellar processes*, *JHEP* **06** (2018) 036 [[1708.08464](#)].
- [114] L. Di Luzio, B. Gavela, P. Quilez and A. Ringwald, *Dark matter from an even lighter QCD axion: trapped misalignment*, [2102.01082](#).
- [115] L. Di Luzio, B. Gavela, P. Quilez and A. Ringwald, *An even lighter QCD axion*, *JHEP* **05** (2021) 184 [[2102.00012](#)].
- [116] J. Zhang, Z. Lyu, J. Huang, M. C. Johnson, L. Sagunski, M. Sakellariadou and H. Yang, *First Constraints on Light Axions from the Binary Neutron Star Gravitational Wave Event GW170817*, [2105.13963](#).
- [117] G. G. Raffelt, *Astrophysical axion bounds*, *Lect. Notes Phys.* **741** (2008) 51 [[hep-ph/0611350](#)].
- [118] G. Ballesteros, J. Redondo, A. Ringwald and C. Tamarit, *Unifying inflation with the axion, dark matter, baryogenesis and the seesaw mechanism*, *Phys. Rev. Lett.* **118** (2017) 071802 [[1608.05414](#)].
- [119] M. Buschmann, J. W. Foster and B. R. Safdi, *Early-Universe Simulations of the Cosmological Axion*, *Phys. Rev. Lett.* **124** (2020) 161103 [[1906.00967](#)].
- [120] M. Buschmann, J. W. Foster, A. Hook, A. Peterson, D. E. Willcox, W. Zhang and B. R. Safdi, *Dark Matter from Axion Strings with Adaptive Mesh Refinement*, [2108.05368](#).
- [121] C. Bonati, M. D’Elia, M. Mariti, G. Martinelli, M. Mesiti, F. Negro, F. Sanfilippo and G. Villadoro, *Axion phenomenology and θ -dependence from $N_f = 2 + 1$ lattice QCD*, *JHEP* **03** (2016) 155 [[1512.06746](#)].
- [122] S. Borsanyi et al., *Calculation of the axion mass based on high-temperature lattice quantum chromodynamics*, *Nature* **539** (2016) 69 [[1606.07494](#)].
- [123] E. Berkowitz, M. I. Buchoff and E. Rinaldi, *Lattice QCD input for axion cosmology*, *Phys. Rev. D* **92** (2015) 034507 [[1505.07455](#)].
- [124] M. Dine, P. Draper, L. Stephenson-Haskins and D. Xu, *Axions, Instantons, and the Lattice*, *Phys. Rev. D* **96** (2017) 095001 [[1705.00676](#)].
- [125] P. Petreczky, H.-P. Schadler and S. Sharma, *The topological susceptibility in finite temperature QCD and axion cosmology*, *Phys. Lett. B* **762** (2016) 498 [[1606.03145](#)].
- [126] L. Fleury and G. D. Moore, *Axion dark matter: strings and their cores*, *JCAP* **01** (2016) 004 [[1509.00026](#)].
- [127] V. B. . Klaer and G. D. Moore, *The dark-matter axion mass*, *JCAP* **11** (2017) 049 [[1708.07521](#)].
- [128] R. T. Co, L. J. Hall and K. Harigaya, *Predictions for Axion Couplings from ALP Cogenesis*, *JHEP* **01** (2021) 172 [[2006.04809](#)].
- [129] N. Blinov, M. J. Dolan, P. Draper and J. Kozaczuk, *Dark matter targets for axionlike particle searches*, *Phys. Rev. D* **100** (2019) 015049 [[1905.06952](#)].

- [130] P. Arias, D. Cadamuro, M. Goodsell, J. Jaeckel, J. Redondo and A. Ringwald, *WISPy Cold Dark Matter*, *JCAP* **06** (2012) 013 [[1201.5902](#)].
- [131] C. A. J. O'Hare and E. Vitagliano, *Cornering the axion with CP-violating interactions*, *Phys. Rev. D* **102** (2020) 115026 [[2010.03889](#)].
- [132] E. Hardy and R. Lasenby, *Stellar cooling bounds on new light particles: plasma mixing effects*, *JHEP* **02** (2017) 033 [[1611.05852](#)].
- [133] J. Bergé, P. Brax, G. Métris, M. Pernot-Borràs, P. Touboul and J.-P. Uzan, *MICROSCOPE Mission: First Constraints on the Violation of the Weak Equivalence Principle by a Light Scalar Dilaton*, *Phys. Rev. Lett.* **120** (2018) 141101 [[1712.00483](#)].
- [134] G. L. Smith, C. D. Hoyle, J. H. Gundlach, E. G. Adelberger, B. R. Heckel and H. E. Swanson, *Short range tests of the equivalence principle*, *Phys. Rev. D* **61** (2000) 022001.
- [135] D. J. Kapner, T. S. Cook, E. G. Adelberger, J. H. Gundlach, B. R. Heckel, C. D. Hoyle and H. E. Swanson, *Tests of the gravitational inverse-square law below the dark-energy length scale*, *Phys. Rev. Lett.* **98** (2007) 021101 [[hep-ph/0611184](#)].
- [136] J. Lee, E. Adelberger, T. Cook, S. Fleischer and B. Heckel, *New Test of the Gravitational $1/r^2$ Law at Separations down to 52 μm* , *Phys. Rev. Lett.* **124** (2020) 101101 [[2002.11761](#)].
- [137] J. K. Hoskins, R. D. Newman, R. Spero and J. Schultz, *Experimental tests of the gravitational inverse square law for mass separations from 2-cm to 105-cm*, *Phys. Rev. D* **32** (1985) 3084.
- [138] J. Ke, J. Luo, C.-G. Shao, Y.-J. Tan, W.-H. Tan and S.-Q. Yang, *Combined Test of the Gravitational Inverse-Square Law at the Centimeter Range*, *Phys. Rev. Lett.* **126** (2021) 211101.
- [139] L.-C. Tu, S.-G. Guan, J. Luo, C.-G. Shao and L.-X. Liu, *Null Test of Newtonian Inverse-Square Law at Submillimeter Range with a Dual-Modulation Torsion Pendulum*, *Phys. Rev. Lett.* **98** (2007) 201101.
- [140] S.-Q. Yang, B.-F. Zhan, Q.-L. Wang, C.-G. Shao, L.-C. Tu, W.-H. Tan and J. Luo, *Test of the Gravitational Inverse Square Law at Millimeter Ranges*, *Phys. Rev. Lett.* **108** (2012) 081101.
- [141] W.-H. Tan et al., *Improvement for Testing the Gravitational Inverse-Square Law at the Submillimeter Range*, *Phys. Rev. Lett.* **124** (2020) 051301.
- [142] W.-H. Tan, S.-Q. Yang, C.-G. Shao, J. Li, A.-B. Du, B.-F. Zhan, Q.-L. Wang, P.-S. Luo, L.-C. Tu and J. Luo, *New Test of the Gravitational Inverse-Square Law at the Submillimeter Range with Dual Modulation and Compensation*, *Phys. Rev. Lett.* **116** (2016) 131101.
- [143] A. A. Geraci, S. J. Smullin, D. M. Weld, J. Chiaverini and A. Kapitulnik, *Improved constraints on non-Newtonian forces at 10 microns*, *Phys. Rev. D* **78** (2008) 022002 [[0802.2350](#)].
- [144] Y.-J. Chen, W. Tham, D. Krause, D. Lopez, E. Fischbach and R. Decca, *Stronger Limits on Hypothetical Yukawa Interactions in the 30–8000 nm Range*, *Phys. Rev. Lett.* **116** (2016) 221102 [[1410.7267](#)].
- [145] B. R. Heckel, E. Adelberger, C. Cramer, T. Cook, S. Schlamminger and U. Schmidt, *Preferred-Frame and CP-Violation Tests with Polarized Electrons*, *Phys. Rev. D* **78** (2008) 092006 [[0808.2673](#)].
- [146] D. J. Wineland, J. J. Bollinger, D. J. Heinzen, W. M. Itano and M. G. Raizen, *Search for anomalous spin-dependent forces using stored-ion spectroscopy*, *Phys. Rev. Lett.* **67** (1991) 1735.
- [147] J. Lee, A. Almasi and M. Romalis, *Improved Limits on Spin-Mass Interactions*, *Phys. Rev. Lett.* **120** (2018) 161801 [[1801.02757](#)].
- [148] N. Crescini, C. Braggio, G. Carugno, P. Falferi, A. Ortolan and G. Ruoso, *The QUAX- $g_p g_s$ experiment to search for monopole-dipole Axion interaction*, *Nucl. Instrum. Meth. A* **842** (2017) 109 [[1606.04751](#)].
- [149] N. Crescini, C. Braggio, G. Carugno, P. Falferi, A. Ortolan and G. Ruoso, *Improved constraints on monopole-dipole interaction mediated by pseudo-scalar bosons*, *Phys. Lett. B* **773** (2017) 677 [[1705.06044](#)].
- [150] W. Terrano, E. Adelberger, J. Lee and B. Heckel, *Short-range spin-dependent interactions of electrons: a probe for exotic pseudo-Goldstone bosons*, *Phys. Rev. Lett.* **115** (2015) 201801 [[1508.02463](#)].

- [151] S. A. Hoedl, F. Fleischer, E. G. Adelberger and B. R. Heckel, *Improved Constraints on an Axion-Mediated Force*, *Phys. Rev. Lett.* **106** (2011) 041801.
- [152] XENON Collaboration, E. Aprile et al., *Light Dark Matter Search with Ionization Signals in XENON1T*, *Phys. Rev. Lett.* **123** (2019) 251801 [[1907.11485](#)].
- [153] B. Venema, P. Majumder, S. Lamoreaux, B. Heckel and E. Fortson, *Search for a coupling of the Earth's gravitational field to nuclear spins in atomic mercury*, *Phys. Rev. Lett.* **68** (1992) 135.
- [154] M. Safronova, D. Budker, D. DeMille, D. F. J. Kimball, A. Derevianko and C. Clark, *Search for New Physics with Atoms and Molecules*, *Rev. Mod. Phys.* **90** (2018) 025008 [[1710.01833](#)].
- [155] K. Tullney et al., *Constraints on Spin-Dependent Short-Range Interaction between Nucleons*, *Phys. Rev. Lett.* **111** (2013) 100801 [[1303.6612](#)].
- [156] A. Arvanitaki and A. A. Geraci, *Resonantly Detecting Axion-Mediated Forces with Nuclear Magnetic Resonance*, *Phys. Rev. Lett.* **113** (2014) 161801 [[1403.1290](#)].
- [157] M. Baryakhtar, M. Galanis, R. Lasenby and O. Simon, *Black hole superradiance of self-interacting scalar fields*, *Phys. Rev. D* **103** (2021) 095019 [[2011.11646](#)].
- [158] M. J. Stott, *Ultralight Bosonic Field Mass Bounds from Astrophysical Black Hole Spin*, [2009.07206](#).
- [159] V. Cardoso, O. J. C. Dias, G. S. Hartnett, M. Middleton, P. Pani and J. E. Santos, *Constraining the mass of dark photons and axion-like particles through black-hole superradiance*, *JCAP* **03** (2018) 043 [[1801.01420](#)].
- [160] A. Caputo, A. J. Millar, C. A. J. O'Hare and E. Vitagliano, *Dark photon limits: a cookbook*, [2105.04565](#).
- [161] A. S. Goldhaber and M. M. Nieto, *Photon and Graviton Mass Limits*, *Rev. Mod. Phys.* **82** (2010) 939 [[0809.1003](#)].
- [162] E. R. Williams, J. E. Faller and H. A. Hill, *New experimental Test of Coulomb's Law: A Laboratory Upper Limit on the Photon Rest Mass*, *Phys. Rev. Lett.* **26** (1971) 721.
- [163] D. F. Bartlett and S. Loegl, *Limits on an Electromagnetic Fifth Force*, *Phys. Rev. Lett.* **61** (1988) 2285.
- [164] L.-C. Tu, J. Luo and G. T. Gillies, *The Mass of the Photon*, *Rept. Prog. Phys.* **68** (2005) 77.
- [165] D. Kroff and P. C. Malta, *Constraining Hidden Photons via Atomic Force Microscope Measurements and the Plimpton-Lawton Experiment*, *Phys. Rev. D* **102** (2020) 095015 [[2008.02209](#)].
- [166] S. J. Plimpton and W. E. Lawton, *A Very Accurate Test of Coulomb's Law of Force Between Charges*, *Phys. Rev.* **50** (1936) 1066.
- [167] J. Jaeckel and S. Roy, *Spectroscopy as a Test of Coulomb's Law: A Probe of the Hidden Sector*, *Phys. Rev. D* **82** (2010) 125020 [[1008.3536](#)].
- [168] A. S. Goldhaber and M. M. Nieto, *Terrestrial and Extra-Terrestrial Limits on the Photon Mass*, *Rev. Mod. Phys.* **43** (1971) 277.
- [169] G. Marocco, *Dark photon limits from magnetic fields and astrophysical plasmas*, [2110.02875](#).
- [170] L. Davis, Jr., A. S. Goldhaber and M. M. Nieto, *Limit on the Photon Mass Deduced from Pioneer-10 Observations of Jupiter's Magnetic Field*, *Phys. Rev. Lett.* **35** (1975) 1402.
- [171] T. Inada, T. Namba, S. Asai, T. Kobayashi, Y. Tanaka, K. Tamasaku, K. Sawada and T. Ishikawa, *Results of a Search for Paraphotons with Intense X-ray Beams at SPring-8*, *Phys. Lett. B* **722** (2013) 301 [[1301.6557](#)].
- [172] R. Povey, J. Hartnett and M. Tobar, *Microwave Cavity Light Shining Through a Wall Optimization and Experiment*, *Phys. Rev. D* **82** (2010) 052003 [[1003.0964](#)].
- [173] S. R. Parker, J. G. Hartnett, R. G. Povey and M. E. Tobar, *Cryogenic Resonant Microwave Cavity Searches for Hidden Sector Photons*, *Phys. Rev. D* **88** (2013) 112004 [[1410.5244](#)].
- [174] ADMX Collaboration, A. Wagner et al., *A Search for Hidden Sector Photons with ADMX*, *Phys. Rev. Lett.* **105** (2010) 171801 [[1007.3766](#)].

- [175] M. Danilov, S. Demidov and D. Gorbunov, *Constraints on Hidden Photons Produced in Nuclear Reactors*, *Phys. Rev. Lett.* **122** (2019) 041801 [[1804.10777](#)].
- [176] H.-S. Zechlin, D. Horns and J. Redondo, *New Constraints on Hidden Photons using Very High Energy Gamma-Rays from the Crab Nebula*, *AIP Conf. Proc.* **1085** (2009) 727 [[0810.5501](#)].
- [177] A. Caputo, H. Liu, S. Mishra-Sharma and J. T. Ruderman, *Dark Photon Oscillations in Our Inhomogeneous Universe*, *Phys. Rev. Lett.* **125** (2020) 221303 [[2002.05165](#)].
- [178] J. Redondo, *Helioscope Bounds on Hidden Sector Photons*, *JCAP* **07** (2008) 008 [[0801.1527](#)].
- [179] M. Schwarz, E.-A. Knabbe, A. Lindner, J. Redondo, A. Ringwald, M. Schneide, J. Susol and G. Wiedemann, *Results from the Solar Hidden Photon Search (SHIPS)*, *JCAP* **08** (2015) 011 [[1502.04490](#)].
- [180] J. Redondo and G. Raffelt, *Solar Constraints on Hidden Photons Re-visited*, *JCAP* **08** (2013) 034 [[1305.2920](#)].
- [181] D. K. Hong, C. S. Shin and S. Yun, *Cooling of young neutron stars and dark gauge bosons*, *Phys. Rev. D* **103** (2021) 123031 [[2012.05427](#)].
- [182] N. Vinyoles, A. Serenelli, F. L. Villante, S. Basu, J. Redondo and J. Isern, *New Axion and Hidden Photon Constraints from a Solar Data Global Fit*, *JCAP* **10** (2015) 015 [[1501.01639](#)].
- [183] S. D. McDermott and S. J. Witte, *Cosmological Evolution of Light Dark Photon Dark Matter*, *Phys. Rev. D* **101** (2020) 063030 [[1911.05086](#)].
- [184] S. J. Witte, S. Rosauro-Alcaraz, S. D. McDermott and V. Poulin, *Dark Photon Dark Matter in the Presence of Inhomogeneous Structure*, *JHEP* **06** (2020) 132 [[2003.13698](#)].
- [185] A. Caputo, H. Liu, S. Mishra-Sharma and J. T. Ruderman, *Modeling Dark Photon Oscillations in Our Inhomogeneous Universe*, *Phys. Rev. D* **102** (2020) 103533 [[2004.06733](#)].
- [186] S. Dubovsky and G. Hernández-Chifflet, *Heating up the Galaxy with Hidden Photons*, *JCAP* **12** (2015) 054 [[1509.00039](#)].
- [187] D. Wadekar and G. R. Farrar, *First Astrophysical Constraints on Dark Matter Interactions with Ordinary Matter at Low Relative Velocity*, [1903.12190](#).
- [188] A. Bhoonah, J. Bramante and N. Song, *Superradiant Searches for Dark Photons in Two Stage Atomic Transitions*, *Phys. Rev. D* **101** (2020) 055040 [[1909.07387](#)].
- [189] DAMIC Collaboration, A. Aguilar-Arevalo et al., *Constraints on Light Dark Matter Particles Interacting with Electrons from DAMIC at SNOLAB*, *Phys. Rev. Lett.* **123** (2019) 181802 [[1907.12628](#)].
- [190] B. Godfrey et al., *Search for dark photon dark matter: Dark E field radio pilot experiment*, *Phys. Rev. D* **104** (2021) 012013 [[2101.02805](#)].
- [191] A. Phipps et al., *Exclusion Limits on Hidden-Photon Dark Matter near 2 neV from a Fixed-Frequency Superconducting Lumped-Element Resonator*, *Springer Proc. Phys.* **245** (2020) 139 [[1906.08814](#)].
- [192] FUNK EXPERIMENT Collaboration, A. Andrianavalomahefa et al., *Limits from the Funk Experiment on the Mixing Strength of Hidden-Photon Dark Matter in the Visible and Near-Ultraviolet Wavelength Range*, *Phys. Rev. D* **102** (2020) 042001 [[2003.13144](#)].
- [193] J. Chiles et al., *First Constraints on Dark Photon Dark Matter with Superconducting Nanowire Detectors in an Optical Haloscope*, [2110.01582](#).
- [194] L. Manenti, U. Mishra, G. Bruno, A. Di Giovanni, A. J. Millar, K. D. Morå, H. Roberts, P. Oikonomou, I. Sarnoff and F. Arneodo, *Search for dark photons using a multilayer dielectric haloscope equipped with a single-photon avalanche diode*, [2110.10497](#).
- [195] SENSEI Collaboration, L. Barak et al., *SENSEI: Direct-Detection Results on sub-GeV Dark Matter from a New Skipper-CCD*, *Phys. Rev. Lett.* **125** (2020) 171802 [[2004.11378](#)].
- [196] P. Brun, L. Chevalier and C. Flouzat, *Direct Searches for Hidden-Photon Dark Matter with the SHUKET Experiment*, *Phys. Rev. Lett.* **122** (2019) 201801 [[1905.05579](#)].

- [197] SUPERCDMS Collaboration, T. Aralis et al., *Constraints on dark photons and axionlike particles from the SuperCDMS Soudan experiment*, *Phys. Rev. D* **101** (2020) 052008 [[1911.11905](#)]. [Erratum: Phys.Rev.D 103, 039901 (2021)].
- [198] M. A. Fedderke, P. W. Graham, D. F. Jackson Kimball and S. Kalia, *Search for dark-photon dark matter in the SuperMAG geomagnetic field dataset*, [2108.08852](#).
- [199] M. A. Fedderke, P. W. Graham, D. F. J. Kimball and S. Kalia, *The Earth as a transducer for dark-photon dark-matter detection*, [2106.00022](#).
- [200] A. V. Dixit, S. Chakram, K. He, A. Agrawal, R. K. Naik, D. I. Schuster and A. Chou, *Searching for Dark Matter with a Superconducting Qubit*, *Phys. Rev. Lett.* **126** (2021) 141302 [[2008.12231](#)].
- [201] J. Suzuki, T. Horie, Y. Inoue and M. Minowa, *Experimental Search for Hidden Photon CDM in the eV mass range with a Dish Antenna*, *JCAP* **09** (2015) 042 [[1504.00118](#)].
- [202] S. Knirck, T. Yamazaki, Y. Okesaku, S. Asai, T. Idehara and T. Inada, *First Results from a Hidden Photon Dark Matter Search in the meV Sector Using a Plane-Parabolic Mirror System*, *JCAP* **11** (2018) 031 [[1806.05120](#)].
- [203] N. Tomita, S. Oguri, Y. Inoue, M. Minowa, T. Nagasaki, J. Suzuki and O. Tajima, *Search for Hidden-Photon Cold Dark Matter Using a K-Band Cryogenic Receiver*, *JCAP* **09** (2020) 012 [[2006.02828](#)].
- [204] L. H. Nguyen, A. Lobanov and D. Horns, *First results from the WISPDMMX Radio Frequency Cavity Searches for Hidden Photon Dark Matter*, *JCAP* **10** (2019) 014 [[1907.12449](#)].
- [205] XENON Collaboration, E. Aprile et al., *Excess Electronic Recoil Events in XENON1T*, *Phys. Rev. D* **102** (2020) 072004 [[2006.09721](#)].
- [206] I. M. Bloch, A. Caputo, R. Essig, D. Redigolo, M. Sholapurkar and T. Volansky, *Exploring New Physics with O(keV) Electron Recoils in Direct Detection Experiments*, *JHEP* **01** (2021) 178 [[2006.14521](#)].