

## 1 Axion-photon

### Haloscopes

- ABRACADABRA [1, 2]
- ADMX [3, 4, 5, 6]
- ADMX-Sidecar [7, 8]
- ADMX-SLIC [9]
- CAPP [10, 11, 12, 13, 14, 15]
- CAST-CAPP [16]
- BASE [17]
- GrAHal [18]
- HAYSTAC [19, 20, 21]
- ORGAN [22, 23]
- QUAX [24, 25, 26]
- RADES [27]
- RBF [28]
- SHAFT [29]
- TASEH [30]
- SuperMAG [?]
- UF [31]
- UPLOAD-DOWNLOAD [32]
- ABRACADABRA (projection) [33]
- ADBC (projection) [34]
- ADMX (projection) [35]
- aLIGO (projection) [36]
- ALPHA (projection) [37, 38]
- BRASS (projection) [39]
- BREAD (projection) [40]
- CADEX (projection) [41]
- DM-Radio (projection) [42, 43]
- DANCE (projection) [44]
- LAMPOST (projection) [45]
- MADMAX (projection) [46]
- FLASH (projection) [47, 48]
- QUAX (projection) [49]
- ORGAN (projection) [22]
- TOORAD (projection) [50]
- Twisted Anyon Cavity (projection) [51]
- WISPLC (projection) [52]
- SRF heterodyne cavity (projection) [53]

### LSW/Helioscopes

- ALPS [54]
- CAST [55, 56]
- CROWS [57]
- OSQAR [58]
- PVLAS [59]
- SAPPHIRES [60, 61]
- ALPS-II (projection) [62]
- IAXO (projection) [63]
- IAXO (Galactic SN) [64]

### Astro

- Betelgeuse [65]
- BICEP/KECK [66]
- Breakthrough Listen (Doppler shifted radio line in MW) [67]
- Breakthrough Listen (Neutron stars) [68]
- Bullet Cluster (archival radio data) [69]
- Cosmic IR background (hint) [70]
- Chandra (Hydra) [71]
- Chandra (M87) [72]
- Chandra (NG7 1275) [73]
- Chandra (H1821+643) [74]
- COBE/FIRAS+Planck spectral dist. [75]
- Diffuse gamma-rays [76]

- Diffuse SN ALPs [77] (see also [78])
- Distance ladder [79]
- Fermi-LAT (NGC 1275) [80]
- Fermi-LAT (Extragalactic SNe) [81]
- Fermi-LAT (Quasars) [82]
- Gamma-ray attenuation (ALP dark matter) [83]
- Globular clusters ( $R$  parameter) [84]
- Globular clusters ( $R_2$  parameter) [85]
- HAWC (TeV Blazars) [86]
- HESS (PKS 2155-304) [87]
- INTEGRAL (ALP decay) [88]
- Leo T gas temperature [89]
- Magnetic white dwarfs (X-rays) [90]
- Magnetic white dwarf (polarization) [91]
- MOJAVE [92]
- Mrk 421 (ARGO-YBJ+Fermi): [93]
- Mrk 421 (ARGO-YBJ+MAGIC): [94]
- Neutron Stars (Foster et al.) [95]
- Neutron Stars (Darling) [96]
- Neutron Stars (Battye et al.) [97]
- Planck cosmic birefringence [98]
- PPTA+QUIJOTE [99]
- Pulsar polarisation arrays (projection) [100]
- Pulsar polar cap [101]
- Red supergiant [102]
- Solar neutrinos [103]
- SN1987A- $\gamma$  (ALP decay) [104, 105]
- SN1987A- $\gamma$  (low mass ALP conversion) [106, 105]
- SN1987A- $\gamma, \nu$  (high mass ALPs) [107]
- Low-energy supernovae (ALP decay) [76]
- Solar basin (NuSTAR) [108]
- Star clusters [109]
- SPT [110]
- Telescopes (Haystack) [111]
- Telescopes (MUSE) [112]
- Telescopes (VIMOS) [113]
- Telescopes (HST) [114, 115]
- Fermi galactic SN (projection) [116]
- THESEUS (projection) [117]
- eROSITA (projection) [118]
- White dwarf initial-final mass relation [119]
- XMM-Newton (decaying DM ALPs) [120]

### Cosmology

- Ionisation fraction, EBL, X-rays [121]
- BBN+ $N_{\text{eff}}$  [122]
- Freeze in [123]

## 2 Heavy ALP-photon coupling

- ATALS (PbPb) [124]
- BaBar [125]
- Beam dump [126, 127, 125, 128, 129]
- Belle II [130]
- BESIII [131]
- CMS (PbPb) [132]
- LEP [133]
- LHC (pp)[134]
- NOMAD [135]
- OPAL [134]
- PrimEx [136]
- CONUS (projection) [137]
- DUNE (projection) [138]
- FASER LLP (projection) [139]

## 3 Axion-electron

- EDELWEISS [140]
- Magnon non-demolition [141]
- GERDA [142]
- LUX [143]
- Panda-X [144]
- SuperCDMS [145]
- XENON1T [146, 147]
- XENONnT [148]
- XENON1T (Solar basin) [149]
- Red giants ( $\omega$ Cen) [150]
- Solar neutrinos [151]
- Magnons (projection) [152]
- Polaritons (projection) [153]
- DARWIN (projection) [154]
- LZ (projection) [155]
- QUAX [156, 157]
- Semiconductors (projection) [158]
- White dwarf hint [159]
- Freeze-in irreducible axions [123]
- X-rays (1-loop decay) [160]

## 4 Axion-nucleon

Note: CASPER and nEDM limits account for stochastic correction reported in [161]

- CASPER-ZULF-Comagnetometer [162]
- CASPER-ZULF-Sidechain [163]
- nEDM (ultracold neutrons and mercury) [164]
- NASDUCK [165, 166]
- PSI HgM [167]
- K-3He comagnetometer (fifth force) [168]
- K-3He comagnetometer (dark matter) [169]
- JEDI [170]
- Old comagnetometers [171]
- Torsion balance [172]
- Neutron star cooling [173] (corrected from [174])
- SN1987A Cooling [175]
- SNO (deuterium dissasociation) [176]
- Proton storage ring (projection) [177]
- DM comagnetometer (projection) [171]
- CASPER-gradient (projection) [163]
- Superfluid helium-3 HPD (projection) [178]

## 5 Axion-EDM

- Beam EDM [179]
- BBN (dark matter) [180]
- CASPER-electric [181]
- nEDM [164]
- HfF<sup>+</sup> [182]
- JEDI [170]
- Rb/Quartz [183]
- SN1987A [184]
- *Planck*+BAO thermal axion bound [185]
- CASPER-electric (projection) [186]
- Storage Ring EDM (projection) [186]

## 6 Axion mass versus $f_a$

- BBN (dark matter) [180]
- Beam EDM [179]
- Binary pulsars and Solar core constraint on  $\bar{\theta}$  [187]. I include minor numerical corrections made by [188, 189].
- GW170817 [190]
- HfF<sup>+</sup> [182]
- Rb/Quartz [183]
- JEDI [170]
- nEDM [164]
- Piezoaxionic effect (projection) [191]
- *Planck*+BAO thermal axion bound [185]
- SN1987A [184]
- Neutron stars (projection) [187].
- NS-NS and NS-BH Inspirals (projection) [187].
- White dwarfs [192]

### 6.1 Black hole superradiance

- Baryakhtar et al. [193] (just Stellar mass BHs)
- Mehta et al. [193] (Stellar mass and SMBHs)
- Stott [194]
- Ünal et al. [195] (Quasars)
- Cardoso et al. [196] (dark photon)

## 7 Axion theory predictions

### 7.1 Post-inflation QCD axion

- Ballesteros et al. [197]
- Buschmann et al. 2020 [198]
- Buschmann et al. 2021 [199]
- Bonati et al. [200]
- Borsanyi et al. [201]
- Berkowitz et al. [202]
- Dine et al. [203]
- Petreczky et al. [204]
- Fleury & Moore [205]
- Klaer & Moore [206]

### 7.2 Other dark matter predictions

- ALP Cogenesis [207]
- Early matter domination [208]
- Post-inflation ALP misalignment [209, 210]
- Trapped misalignment ( $\mathcal{Z}_N$  axion) [188]

## 8 CP-violating couplings

Combined constraints [211]

### Scalar-nucleon

- Red giants [212]
- MICROSCOPE [213].
- Eot-Wash [214, 215, 216]
- Irvine [217]. Corrected to  $2\sigma$  limit by [218]
- HUST [219, 220, 221, 222].
- Stanford [223]
- IUPUI [224].
- Wuhan [218]

### Pseudoscalar-electron

- Red giants [212]
- Eot-wash [225]
- NIST [226]
- SMILE [227].
- QUAX [228, 229]
- Washington [230, 231].
- XENONIT [232]
- Magnon (projection) [153]
- QUAX (projection) [228].

### Pseudoscalar-nucleon

- Neutron star cooling [174]
- Washington [233]. Limit taken from [234].
- SMILE [227].
- Mainz [235]
- ARIADNE (projection) [236]
- CASPER-wind (projection) [186]
- DM comagnetometer (projection) [171]

## 9 Scalars

### Scalar-photon

- Globular clusters [85]
- Eot-Wash (EP) [237]
- Fifth force [238]
- MICROSCOPE [213]
- AURIGA [239]
- BACON [240]
- Cs/Cav [241]
- DAMNED [242]
- Dy/Dy [243]
- Dy/Quartz [183]
- Dynamic Decoupling [244]
- GEO600 [245]
- Holometer [246]
- H/Quartz/Sapphire [247]
- PTB (Yb+, Sr clock) [248]
- I<sub>2</sub> [249]
- Rb/Cs [250]
- Sr/Si [251]
- AEDGE (projection) [252]
- AION (projection) [252]
- DUAL (projection) [238]
- MAGIS (projection) [253]
- Nuclear clock (projection) [254]
- Mechanical Resonators (projection) [255]

### Scalar-electron

- Red giants [212]
- Eot-Wash (EP) [237]
- Fifth force [238]
- MICROSCOPE [213]
- AURIGA [239]
- Cs/Cav [241]
- DAMNED [242]
- GEO600 [245]
- Holometer [246]
- H/Quartz/Sapphire [247]
- I<sub>2</sub> [249]
- H/Si [251]
- Rb/Quartz [183]
- AEDGE (projection) [252]
- AION (projection) [252]
- DUAL (projection) [238]
- Optical microwave clock (projection) [238]
- Optical cavities [256]
- SrOH [257]
- Mechanical Resonators (projection) [255]
- IPTA (mock data) [258]

## 10 Vectors

### B-L coupling

- Casimir [259, 260, 261]
- Eot-Wash (EP) [237]
- Eot-Wash (ISL) [262]
- MICROSCOPE [263]
- DM stability [264]
- Horizontal branch [212]
- Sun [212]
- Eot-Wash (DM) [265]
- LIGO (O1) [266]
- LIGO/VIRGO [266]
- Asteroids (projection) [267]
- LISA (projection) [267]
- MAGIS (projection) [253]
- Optomechanical membranes (projection) [268]
- SKA (projection) [269]
- Torsion balance (projection) [269]

## 11 Dark photons

Combined constraints [270]

### SM photon-DP transitions

- Coulomb [271, 272, 273, 274, 275],
- Plimpton & Lawton's experiment [276, 275]
- Atomic spectroscopy [277]
- Atomic force microscopy (AFM) [275]
- Static magnetic field of the Earth [278, 279, 280]
- Static magnetic field of Jupiter [281, 280].
- ALPs [54]
- SPring-8 [282]
- UWA-LSW [283, 284]
- ADMX-LSW [285]
- CROWS [57].
- DarkSRF [286]
- TEXONO [287]
- Crab nebula [288]
- COBE and FIRAS [289]

### Production in stars

- CAST [290]
- SHIP [291]
- HINODE [292]
- HB and RG stars [293]
- Neutron stars [294]
- Solar neutrinos [295]
- XENON1T [296]

### Dark matter cosmology/astro

- Arias et al. [209]
- Witte et al. [297, 298]
- Caputo et al. [299, 289],
- IGM [300],
- Leo T dwarf [301]
- Gas clouds [302]

### Dark matter experiments

- Reinterpreted axion limits [270]
- BREAD (projection) [40]
- DAMIC [303]
- Dark E-field Radio [304]
- DM Pathfinder [305]
- DOSUE-RR [306]
- FAST Radio antenna [307]
- FUNK [308]
- LAMPOST [309]
- LOFAR (solar corona) [310]
- MuDHI [311]
- ORGAN [312]
- ORPHEUS [313]
- QUALIPHIDE [314]
- Quantum cyclotron [315]
- SENSEI [316]
- SHUKET [317]
- SuperCDMS [318]
- SuperMAG [319, 320]
- SQuAD [321],
- SQMS [322],
- Tokyo dish antennae experiments [323, 324, 325]
- WISPDMS [326]
- XENON(100,1T,nT) [158, 232, 327, 328, 296, 329].

## References

- [1] J. L. Ouellet et al., *First Results from ABRACADABRA-10 cm: A Search for Sub- $\mu\text{eV}$  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  $\mu\text{eV}$  Mass Range*, *Phys. Rev. Lett.* **127** (2021) 261803 [[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  $\mu\text{eV}$* , *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  $\mu\text{eV}$* , *Phys. Rev. Lett.* **126** (2021) 191802 [[2012.10764](#)].
- [13] Y. Lee, B. Yang, H. Yoon, M. Ahn, H. Park, B. Min, D. Kim and J. Yoo, *Searching for Invisible Axion Dark Matter with an 18 T Magnet Haloscope*, *Phys. Rev. Lett.* **128** (2022) 241805 [[2206.08845](#)].
- [14] J. Kim et al., *Near-Quantum-Noise Axion Dark Matter Search at CAPP around 9.5  $\mu\text{eV}$* , [2207.13597](#).
- [15] A. K. Yi et al., *DFSZ Axion Dark Matter Search around 4.55  $\mu\text{eV}$* , [2210.10961](#).
- [16] C. M. Adair et al., *Search for Dark Matter Axions with CAST-CAPP*, *Nature Commun.* **13** (2022) 6180 [[2211.02902](#)].
- [17] 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](#)].
- [18] T. Grenet, R. Ballou, Q. Basto, K. Martineau, P. Perrier, P. Pugnât, J. Quevillon, N. Roch and C. Smith, *The Grenoble Axion Haloscope platform (GrAHal): development plan and first results*, [2110.14406](#).
- [19] 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](#)].
- [20] HAYSTAC Collaboration, K. M. Backes et al., *A quantum-enhanced search for dark matter axions*, *Nature* **590** (2021) 238 [[2008.01853](#)].
- [21] M. J. Jewell et al., *New Results from HAYSTAC's Phase II Operation with a Squeezed State Receiver*, [2301.09721](#).
- [22] 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](#)].
- [23] A. P. Quiskamp, B. T. McAllister, P. Altin, E. N. Ivanov, M. Goryachev and M. E. Tobar, *Direct search for dark matter axions excluding ALPogenesis in the 63- to 67- $\mu\text{eV}$  range with the ORGAN experiment*, *Sci. Adv.* **8** (2022) abq3765 [[2203.12152](#)].
- [24] D. Alesini et al., *Galactic axions search with a superconducting resonant cavity*, *Phys. Rev. D* **99** (2019) 101101 [[1903.06547](#)].
- [25] 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](#)].
- [26] D. Alesini et al., *Search for Galactic axions with a high-Q dielectric cavity*, *Phys. Rev. D* **106** (2022) 052007 [[2208.12670](#)].
- [27] CAST Collaboration, A. A. Melcón et al., *First results of the CAST-RADES haloscope search for axions at 34.67  $\mu\text{eV}$* , *JHEP* **21** (2020) 075 [[2104.13798](#)].
- [28] 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.
- [29] 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](#)].



- [30] TASEH Collaboration, H. Chang et al., *First Results from the Taiwan Axion Search Experiment with a Haloscope at 19.6  $\mu\text{eV}$* , *Phys. Rev. Lett.* **129** (2022) 111802 [2205.05574].
- [31] C. Hagmann, P. Sikivie, N. S. Sullivan and D. B. Tanner, *Results from a search for cosmic axions*, *Phys. Rev. D* **42** (1990) 1297.
- [32] 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)].
- [33] ABRACADABRA, <https://abracadabra.mit.edu/>.
- [34] 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].
- [35] I. Stern, *ADMX Status*, *PoS ICHEP2016* (2016) 198 [1612.08296].
- [36] 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].
- [37] M. Lawson, A. J. Millar, M. Pancaldi, E. Vitagliano and F. Wilczek, *Tunable axion plasma haloscopes*, *Phys. Rev. Lett.* **123** (2019) 141802 [1904.11872].
- [38] A. J. Millar et al., *ALPHA: Searching For Dark Matter with Plasma Haloscopes*, 2210.00017.
- [39] BRASS, <https://www1.physik.uni-hamburg.de/iexp/gruppe-horns/forschung/brass.html>.
- [40] BREAD Collaboration, J. Liu et al., *Broadband Solenoidal Haloscope for Terahertz Axion Detection*, *Phys. Rev. Lett.* **128** (2022) 131801 [2111.12103].
- [41] B. Aja et al., *The Canfranc Axion Detection Experiment (CADEx): search for axions at 90 GHz with Kinetic Inductance Detectors*, *JCAP* **11** (2022) 044 [2206.02980].
- [42] DMRadio, [https://indico.mit.edu/event/151/contributions/295/attachments/96/172/Dark%20Matter%20Radio\\_CambridgeAxions2021.pdf](https://indico.mit.edu/event/151/contributions/295/attachments/96/172/Dark%20Matter%20Radio_CambridgeAxions2021.pdf).
- [43] DMRADIO Collaboration, L. Brouwer et al., *Projected sensitivity of DMRadio-m3: A search for the QCD axion below 1  $\mu\text{eV}$* , *Phys. Rev. D* **106** (2022) 103008 [2204.13781].
- [44] 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].
- [45] 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].
- [46] S. Beurthey et al., *MADMAX Status Report*, 2003.10894.
- [47] D. Alesini, D. Babusci, D. Di Gioacchino, C. Gatti, G. Lamanna and C. Ligi, *The KLASH Proposal*, 1707.06010.
- [48] C. Gatti, *From KLASH to FLASH: A Proposal for a 100-300 MHz Haloscope*, <https://indico.cern.ch/event/1115163/contributions/4685952/attachments/2393240/4091553/FLASH-100MHZHaloscopeWorkshop.pdf>.
- [49] A. Rettaroli, *Probing the axion-photon interaction with QUAX experiment: status and perspectives*, [https://agenda.infn.it/event/20431/contributions/137687/attachments/82511/108428/Rettaroli\\_Patras2021\\_compressed.pdf](https://agenda.infn.it/event/20431/contributions/137687/attachments/82511/108428/Rettaroli_Patras2021_compressed.pdf).
- [50] 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].
- [51] J. F. Bourhill, E. C. I. Paterson, M. Goryachev and M. E. Tobar, *Twisted Anyon Cavity Resonators with Bulk Modes of Chiral Symmetry and Sensitivity to Ultra-Light Axion Dark Matter*, 2208.01640.
- [52] Z. Zhang, D. Horns and O. Ghosh, *Search for dark matter with an LC circuit*, *Phys. Rev. D* **106** (2022) 023003 [2111.04541].
- [53] A. Berlin, R. T. D'Agnolo, S. A. R. Ellis and K. Zhou, *Heterodyne broadband detection of axion dark matter*, *Phys. Rev. D* **104** (2021) L111701 [2007.15656].
- [54] K. Ehret et al., *New ALPS Results on Hidden-Sector Lightweights*, *Phys. Lett. B* **689** (2010) 149 [1004.1313].
- [55] 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].
- [56] CAST Collaboration, V. Anastassopoulos et al., *New CAST Limit on the Axion-Photon Interaction*, *Nature Phys.* **13** (2017) 584 [1705.02290].
- [57] 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].
- [58] 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].
- [59] 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].

- [60] 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*, *JHEP* **12** (2021) 108 [2105.01224].
- [61] SAPPHIRES Collaboration, Y. Kirita et al., *Search for sub-eV axion-like particles in a stimulated resonant photon-photon collider with two laser beams based on a novel method to discriminate pressure-independent components*, *JHEP* **10** (2022) 176 [2208.09880].
- [62] M. D. Ortiz et al., *Design of the ALPS II optical system*, *Phys. Dark Univ.* **35** (2022) 100968 [2009.14294].
- [63] IAXO Collaboration, E. Armengaud et al., *Physics potential of the International Axion Observatory (IAXO)*, *JCAP* **06** (2019) 047 [1904.09155].
- [64] 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].
- [65] M. Xiao, K. M. Perez, M. Giannotti, O. Straniero, A. Mirizzi, B. W. Grefenstette, B. M. Roach and M. Nynka, *Constraints on Axionlike Particles from a Hard X-Ray Observation of Betelgeuse*, *Phys. Rev. Lett.* **126** (2021) 031101 [2009.09059].
- [66] BICEP/Keck Collaboration, P. A. R. Ade et al., *BICEP/Keck XIV: Improved constraints on axionlike polarization oscillations in the cosmic microwave background*, *Phys. Rev. D* **105** (2022) 022006 [2108.03316].
- [67] A. Keller, S. O'Brien, A. Kamdar, N. M. Rapidis, A. F. Leder and K. van Bibber, *A Model-independent Radio Telescope Dark Matter Search*, *Astrophys. J.* **927** (2022) 71 [2112.03439].
- [68] J. W. Foster, S. J. Witte, M. Lawson, T. Linden, V. Gajjar, C. Weniger and B. R. Safdi, *Extraterrestrial Axion Search with the Breakthrough Listen Galactic Center Survey*, *Phys. Rev. Lett.* **129** (2022) 251102 [2202.08274].
- [69] M. H. Chan, *Constraining the axion-photon coupling using radio data of the Bullet Cluster*, *Sci. Rep.* **11** (2021) 20087 [2109.11734].
- [70] K. Kohri and H. Kodama, *Axion-Like Particles and Recent Observations of the Cosmic Infrared Background Radiation*, *Phys. Rev. D* **96** (2017) 051701 [1704.05189].
- [71] 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].
- [72] 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].
- [73] 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].
- [74] 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*, *Mon. Not. Roy. Astron. Soc.* **510** (2021) 1264 [2109.03261].
- [75] B. Bolliet, J. Chluba and R. Battye, *Spectral distortion constraints on photon injection from low-mass decaying particles*, *Mon. Not. Roy. Astron. Soc.* **507** (2021) 3148 [2012.07292].
- [76] A. Caputo, H.-T. Janka, G. Raffelt and E. Vitagliano, *Low-Energy Supernovae Severely Constrain Radiative Particle Decays*, *Phys. Rev. Lett.* **128** (2022) 221103 [2201.09890].
- [77] 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 the diffuse supernova axion-like particle background*, *Phys. Rev. D* **105** (2022) 063028 [2110.03679].
- [78] 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].
- [79] M. A. Buen-Abad, J. Fan and C. Sun, *Constraints on Axions from Cosmic Distance Measurements*, **2011.05993**.
- [80] 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].
- [81] M. Meyer and T. Petrushevska, *Search for Axionlike-Particle-Induced Prompt  $\gamma$ -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)].
- [82] J. Davies, M. Meyer and G. Cotter, *Constraints on axionlike particles from a combined analysis of three flaring Fermi flat-spectrum radio quasars*, **2211.03414**.
- [83] J. L. Bernal, A. Caputo, G. Sato-Polito, J. Mirocha and M. Kamionkowski, *Seeking dark matter with  $\gamma$ -ray attenuation*, **2208.13794**.
- [84] 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].
- [85] M. J. Dolan, F. J. Hiskens and R. R. Volkas, *Advancing globular cluster constraints on the axion-photon coupling*, *JCAP* **10** (2022) 096 [2207.03102].
- [86] S. Jacobsen, T. Linden and K. Freese, *Constraining Axion-Like Particles with HAWC Observations of TeV Blazars*, **2203.04332**.
- [87] 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].

- [88] F. Calore, A. Dekker, P. D. Serpico and T. Siebert, *Constraints on light decaying dark matter candidates from 16 years of INTEGRAL/SPI observations*, [2209.06299](#).
- [89] D. Wadekar and Z. Wang, *Strong constraints on decay and annihilation of dark matter from heating of gas-rich dwarf galaxies*, *Phys. Rev. D* **106** (2022) 075007 [[2111.08025](#)].
- [90] C. Dessert, A. J. Long and B. R. Safdi, *No Evidence for Axions from Chandra Observation of the Magnetic White Dwarf RE J0317-853*, *Phys. Rev. Lett.* **128** (2022) 071102 [[2104.12772](#)].
- [91] C. Dessert, D. Dunsby and B. R. Safdi, *Upper limit on the axion-photon coupling from magnetic white dwarf polarization*, *Phys. Rev. D* **105** (2022) 103034 [[2203.04319](#)].
- [92] M. M. Ivanov, Y. Y. Kovalev, M. L. Lister, A. G. Panin, A. B. Pushkarev, T. Savolainen and S. V. Troitsky, *Constraining the photon coupling of ultra-light dark-matter axion-like particles by polarization variations of parsec-scale jets in active galaxies*, *JCAP* **02** (2019) 059 [[1811.10997](#)].
- [93] 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](#)].
- [94] H.-J. Li, X.-J. Bi and P.-F. Yin, *Searching for axion-like particles with the blazar observations of MAGIC and Fermi-LAT \**, *Chin. Phys. C* **46** (2022) 085105 [[2110.13636](#)].
- [95] 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](#)].
- [96] J. Darling, *New Limits on Axionic Dark Matter from the Magnetar PSR J1745-2900*, *Astrophys. J. Lett.* **900** (2020) L28 [[2008.11188](#)].
- [97] R. A. Battye, J. Darling, J. I. McDonald and S. Srinivasan, *Towards robust constraints on axion dark matter using PSR J1745-2900*, *Phys. Rev. D* **105** (2022) L021305 [[2107.01225](#)].
- [98] M. A. Fedderke, P. W. Graham and S. Rajendran, *Axion Dark Matter Detection with CMB Polarization*, *Phys. Rev. D* **100** (2019) 015040 [[1903.02666](#)].
- [99] A. Castillo, J. Martin-Camalich, J. Terol-Calvo, D. Blas, A. Caputo, R. T. G. Santos, L. Sberna, M. Peel and J. A. Rubiño Martín, *Searching for dark-matter waves with PPTA and QUIJOTE pulsar polarimetry*, *JCAP* **06** (2022) 014 [[2201.03422](#)].
- [100] T. Liu, X. Lou and J. Ren, *Pulsar Polarization Arrays*, [2111.10615](#).
- [101] D. Noordhuis, A. Prabhu, S. J. Witte, A. Y. Chen, F. Cruz and C. Weniger, *Novel Constraints on Axions Produced in Pulsar Polar Cap Cascades*, [2209.09917](#).
- [102] C. Severino and I. Lopes, *Asteroseismology: Looking for axions in the red supergiant star Alpha Ori*, [2212.01890](#).
- [103] 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](#)].
- [104] 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](#)].
- [105] S. Hoof and L. Schulz, *Updated constraints on axion-like particles from temporal information in supernova SN1987A gamma-ray data*, [2212.09764](#).
- [106] 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](#)].
- [107] A. Caputo, G. Raffelt and E. Vitagliano, *Muonic boson limits: Supernova redux*, *Phys. Rev. D* **105** (2022) 035022 [[2109.03244](#)].
- [108] W. DeRocco, S. Wegsman, B. Grefenstette, J. Huang and K. Van Tilburg, *First Indirect Detection Constraints on Axions in the Solar Basin*, *Phys. Rev. Lett.* **129** (2022) 101101 [[2205.05700](#)].
- [109] 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](#)].
- [110] SPT-3G Collaboration, K. R. Ferguson et al., *Searching for axionlike time-dependent cosmic birefringence with data from SPT-3G*, *Phys. Rev. D* **106** (2022) 042011 [[2203.16567](#)].
- [111] 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](#)].
- [112] 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](#)].
- [113] 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](#)].
- [114] K. Nakayama and W. Yin, *Anisotropic cosmic optical background bound for decaying dark matter in light of the LORRI anomaly*, *Phys. Rev. D* **106** (2022) 103505 [[2205.01079](#)].
- [115] P. Carena, G. Lucente and E. Vitagliano, *Probing the Blue Axion with Cosmic Optical Background Anisotropies*, [2301.06560](#).



- [116] 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](#)].
- [117] 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](#)].
- [118] 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](#)].
- [119] 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](#)].
- [120] 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](#)].
- [121] D. Cadamuro and J. Redondo, *Cosmological bounds on pseudo Nambu-Goldstone bosons*, *JCAP* **02** (2012) 032 [[1110.2895](#)].
- [122] P. F. Depta, M. Hufnagel and K. Schmidt-Hoberg, *Robust cosmological constraints on axion-like particles*, *JCAP* **05** (2020) 009 [[2002.08370](#)].
- [123] K. Langhoff, N. J. Outmezguine and N. L. Rodd, *Irreducible Axion Background*, *Phys. Rev. Lett.* **129** (2022) 241101 [[2209.06216](#)].
- [124] ATLAS Collaboration, G. Aad et al., *Measurement of light-by-light scattering and search for axion-like particles with 2.2 nb<sup>-1</sup> of Pb+Pb data with the ATLAS detector*, *JHEP* **03** (2021) 243 [[2008.05355](#)]. [Erratum: JHEP 11, 050 (2021)].
- [125] M. J. Dolan, T. Ferber, C. Hearty, F. Kahlhoefer and K. Schmidt-Hoberg, *Revised constraints and Belle II sensitivity for visible and invisible axion-like particles*, *JHEP* **12** (2017) 094 [[1709.00009](#)]. [Erratum: JHEP 03, 190 (2021)].
- [126] CHARM Collaboration, F. Bergsma et al., *Search for Axion Like Particle Production in 400-GeV Proton - Copper Interactions*, *Phys. Lett. B* **157** (1985) 458.
- [127] E. M. Riordan et al., *A Search for Short Lived Axions in an Electron Beam Dump Experiment*, *Phys. Rev. Lett.* **59** (1987) 755.
- [128] J. Blumlein et al., *Limits on neutral light scalar and pseudoscalar particles in a proton beam dump experiment*, *Z. Phys. C* **51** (1991) 341.
- [129] NA64 Collaboration, D. Banerjee et al., *Search for Axionlike and Scalar Particles with the NA64 Experiment*, *Phys. Rev. Lett.* **125** (2020) 081801 [[2005.02710](#)].
- [130] BELLE-II Collaboration, F. Abudinén et al., *Search for Axion-Like Particles produced in e<sup>+</sup>e<sup>-</sup> collisions at Belle II*, *Phys. Rev. Lett.* **125** (2020) 161806 [[2007.13071](#)].
- [131] BESIII Collaboration, M. Ablikim et al., *Search for an axion-like particle in J/ψ radiative decays*, [2211.12699](#).
- [132] CMS Collaboration, A. M. Sirunyan et al., *Evidence for light-by-light scattering and searches for axion-like particles in ultraperipheral PbPb collisions at  $\sqrt{s_{NN}} = 5.02$  TeV*, *Phys. Lett. B* **797** (2019) 134826 [[1810.04602](#)].
- [133] J. Jaeckel and M. Spannowsky, *Probing MeV to 90 GeV axion-like particles with LEP and LHC*, *Phys. Lett. B* **753** (2016) 482 [[1509.00476](#)].
- [134] S. Knapen, T. Lin, H. K. Lou and T. Melia, *Searching for Axionlike Particles with Ultraperipheral Heavy-Ion Collisions*, *Phys. Rev. Lett.* **118** (2017) 171801 [[1607.06083](#)].
- [135] NOMAD Collaboration, P. Astier et al., *Search for eV (pseudo)scalar penetrating particles in the SPS neutrino beam*, *Phys. Lett. B* **479** (2000) 371.
- [136] PRIMEx Collaboration, I. Larin et al., *A New Measurement of the  $\pi^0$  Radiative Decay Width*, *Phys. Rev. Lett.* **106** (2011) 162303 [[1009.1681](#)].
- [137] J. B. Dent, B. Dutta, D. Kim, S. Liao, R. Mahapatra, K. Sinha and A. Thompson, *New Directions for Axion Searches via Scattering at Reactor Neutrino Experiments*, *Phys. Rev. Lett.* **124** (2020) 211804 [[1912.05733](#)].
- [138] V. Brdar, B. Dutta, W. Jang, D. Kim, I. M. Shoemaker, Z. Tabrizi, A. Thompson and J. Yu, *Axionlike Particles at Future Neutrino Experiments: Closing the Cosmological Triangle*, *Phys. Rev. Lett.* **126** (2021) 201801 [[2011.07054](#)].
- [139] FASER Collaboration, A. Ariga et al., *FASER's physics reach for long-lived particles*, *Phys. Rev. D* **99** (2019) 095011 [[1811.12522](#)].
- [140] 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](#)].
- [141] T. Ikeda, A. Ito, K. Miuchi, J. Soda, H. Kurashige and Y. Shikano, *Axion search with quantum nondemolition detection of magnons*, *Phys. Rev. D* **105** (2022) 102004 [[2102.08764](#)].
- [142] GERDA Collaboration, M. Agostini et al., *First Search for Bosonic Superweakly Interacting Massive Particles with Masses up to 1 MeV/c<sup>2</sup> with GERDA*, *Phys. Rev. Lett.* **125** (2020) 011801 [[2005.14184](#)].
- [143] 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](#)].
- [144] 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](#)].

- [145] 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)].
- [146] XENON Collaboration, E. Aprile et al., *Light Dark Matter Search with Ionization Signals in XENON1T*, *Phys. Rev. Lett.* **123** (2019) 251801 [[1907.11485](#)].
- [147] XENON Collaboration, E. Aprile et al., *Excess electronic recoil events in XENON1T*, *Phys. Rev. D* **102** (2020) 072004 [[2006.09721](#)].
- [148] (XENON COLLABORATION)††, XENON Collaboration, E. Aprile et al., *Search for New Physics in Electronic Recoil Data from XENONnT*, *Phys. Rev. Lett.* **129** (2022) 161805 [[2207.11330](#)].
- [149] K. Van Tilburg, *Stellar basins of gravitationally bound particles*, *Phys. Rev. D* **104** (2021) 023019 [[2006.12431](#)].
- [150] 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](#)].
- [151] P. Gondolo and G. G. Raffelt, *Solar neutrino limit on axions and keV-mass bosons*, *Phys. Rev. D* **79** (2009) 107301 [[0807.2926](#)].
- [152] 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](#)].
- [153] 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](#)].
- [154] DARWIN Collaboration, J. Aalbers et al., *DARWIN: towards the ultimate dark matter detector*, *JCAP* **11** (2016) 017 [[1606.07001](#)].
- [155] LZ Collaboration, D. S. Akerib et al., *Projected sensitivities of the LUX-ZEPLIN experiment to new physics via low-energy electron recoils*, *Phys. Rev. D* **104** (2021) 092009 [[2102.11740](#)].
- [156] 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)].
- [157] QUAX Collaboration, N. Crescini et al., *Axion search with a quantum-limited ferromagnetic haloscope*, *Phys. Rev. Lett.* **124** (2020) 171801 [[2001.08940](#)].
- [158] 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](#)].
- [159] M. Giannotti, I. G. Irastorza, J. Redondo, A. Ringwald and K. Saikawa, *Stellar Recipes for Axion Hunters*, *JCAP* **10** (2017) 010 [[1708.02111](#)].
- [160] R. Z. Ferreira, M. C. D. Marsh and E. Müller, *Do Direct Detection Experiments Constrain Axionlike Particles Coupled to Electrons?*, *Phys. Rev. Lett.* **128** (2022) 221302 [[2202.08858](#)].
- [161] G. P. Centers et al., *Stochastic fluctuations of bosonic dark matter*, *Nature Commun.* **12** (2021) 7321 [[1905.13650](#)].
- [162] T. Wu et al., *Search for Axionlike Dark Matter with a Liquid-State Nuclear Spin Comagnetometer*, *Phys. Rev. Lett.* **122** (2019) 191302 [[1901.10843](#)].
- [163] A. Garcon et al., *Constraints on bosonic dark matter from ultralow-field nuclear magnetic resonance*, *Sci. Adv.* **5** (2019) eaax4539 [[1902.04644](#)].
- [164] 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](#)].
- [165] NASDUCK Collaboration, I. M. Bloch, G. Ronen, R. Shaham, O. Katz, T. Volansky and O. Katz, *New constraints on axion-like dark matter using a Floquet quantum detector*, *Sci. Adv.* **8** (2022) ab18919 [[2105.04603](#)].
- [166] NASDUCK Collaboration, I. M. Bloch, R. Shaham, Y. Hochberg, E. Kuflik, T. Volansky and O. Katz, *NASDUCK SERF: New constraints on axion-like dark matter from a SERF comagnetometer*, [2209.13588](#).
- [167] C. Abel et al., *Search for ultralight axion dark matter in a side-band analysis of a  $^{199}\text{Hg}$  free-spin precession signal*, [2212.02403](#).
- [168] 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](#)].
- [169] J. Lee, M. Lisanti, W. A. Terrano and M. Romalis, *Laboratory Constraints on the Neutron-Spin Coupling of feV-scale Axions*, [2209.03289](#).
- [170] JEDI Collaboration, S. Karanth et al., *First Search for Axion-Like Particles in a Storage Ring Using a Polarized Deuteron Beam*, [2208.07293](#).
- [171] 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](#)].
- [172] 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](#)].
- [173] M. Buschmann, C. Dessert, J. W. Foster, A. J. Long and B. R. Safdi, *Upper Limit on the QCD Axion Mass from Isolated Neutron Star Cooling*, *Phys. Rev. Lett.* **128** (2022) 091102 [[2111.09892](#)].

- [174] 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](#)].
- [175] 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)].
- [176] 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](#)].
- [177] 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](#)].
- [178] C. Gao, W. Halperin, Y. Kahn, M. Nguyen, J. Schütte-Engel and J. W. Scott, *Axion Wind Detection with the Homogeneous Precession Domain of Superfluid Helium-3*, *Phys. Rev. Lett.* **129** (2022) 211801 [[2208.14454](#)].
- [179] I. Schulthess et al., *New Limit on Axionlike Dark Matter Using Cold Neutrons*, *Phys. Rev. Lett.* **129** (2022) 191801 [[2204.01454](#)].
- [180] 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](#)].
- [181] D. Aybas et al., *Search for Axionlike Dark Matter Using Solid-State Nuclear Magnetic Resonance*, *Phys. Rev. Lett.* **126** (2021) 141802 [[2101.01241](#)].
- [182] T. S. Roussy et al., *Experimental Constraint on Axionlike Particles over Seven Orders of Magnitude in Mass*, *Phys. Rev. Lett.* **126** (2021) 171301 [[2006.15787](#)].
- [183] X. Zhang, A. Banerjee, M. Leyser, G. Perez, S. Schiller, D. Budker and D. Antypas, *Search for ultralight dark matter with spectroscopy of radio-frequency atomic transitions*, [2212.04413](#).
- [184] P. W. Graham and S. Rajendran, *New Observables for Direct Detection of Axion Dark Matter*, *Phys. Rev. D* **88** (2013) 035023 [[1306.6088](#)].
- [185] L. Caloni, M. Gerbino, M. Lattanzi and L. Visinelli, *Novel cosmological bounds on thermally-produced axion-like particles*, *JCAP* **09** (2022) 021 [[2205.01637](#)].
- [186] D. F. Jackson Kimball et al., *Overview of the Cosmic Axion Spin Precession Experiment (CASPEr)*, *Springer Proc. Phys.* **245** (2020) 105 [[1711.08999](#)].
- [187] A. Hook and J. Huang, *Probing axions with neutron star inspirals and other stellar processes*, *JHEP* **06** (2018) 036 [[1708.08464](#)].
- [188] L. Di Luzio, B. Gavela, P. Quilez and A. Ringwald, *Dark matter from an even lighter QCD axion: trapped misalignment*, *JCAP* **10** (2021) 001 [[2102.01082](#)].
- [189] L. Di Luzio, B. Gavela, P. Quilez and A. Ringwald, *An even lighter QCD axion*, *JHEP* **05** (2021) 184 [[2102.00012](#)].
- [190] J. Zhang, Z. Lyu, J. Huang, M. C. Johnson, L. Sagunski, M. Sakellariadou and H. Yang, *First Constraints on Nuclear Coupling of Axionlike Particles from the Binary Neutron Star Gravitational Wave Event GW170817*, *Phys. Rev. Lett.* **127** (2021) 161101 [[2105.13963](#)].
- [191] A. Arvanitaki, A. Madden and K. Van Tilburg, *The Piezoaxionic Effect*, [2112.11466](#).
- [192] R. Balkin, J. Serra, K. Springmann, S. Stelzl and A. Weiler, *White dwarfs as a probe of light QCD axions*, [2211.02661](#).
- [193] 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](#)].
- [194] M. J. Stott, *Ultralight Bosonic Field Mass Bounds from Astrophysical Black Hole Spin*, [2009.07206](#).
- [195] C. Ünal, F. Pacucci and A. Loeb, *Properties of ultralight bosons from heavy quasar spins via superradiance*, *JCAP* **05** (2021) 007 [[2012.12790](#)].
- [196] 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](#)].
- [197] 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](#)].
- [198] M. Buschmann, J. W. Foster and B. R. Safdi, *Early-Universe Simulations of the Cosmological Axion*, *Phys. Rev. Lett.* **124** (2020) 161103 [[1906.00967](#)].
- [199] 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*, *Nature Commun.* **13** (2022) 1049 [[2108.05368](#)].
- [200] C. Bonati, M. D’Elia, M. Mariti, G. Martinelli, M. Mesiti, F. Negro, F. Sanfilippo and G. Villadoro, *Axion phenomenology and  $\theta$ -dependence from  $N_f = 2 + 1$  lattice QCD*, *JHEP* **03** (2016) 155 [[1512.06746](#)].
- [201] S. Borsanyi et al., *Calculation of the axion mass based on high-temperature lattice quantum chromodynamics*, *Nature* **539** (2016) 69 [[1606.07494](#)].
- [202] E. Berkowitz, M. I. Buchoff and E. Rinaldi, *Lattice QCD input for axion cosmology*, *Phys. Rev. D* **92** (2015) 034507 [[1505.07455](#)].



- [203] M. Dine, P. Draper, L. Stephenson-Haskins and D. Xu, *Axions, Instantons, and the Lattice*, *Phys. Rev. D* **96** (2017) 095001 [1705.00676].
- [204] 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].
- [205] L. Fleury and G. D. Moore, *Axion dark matter: strings and their cores*, *JCAP* **01** (2016) 004 [1509.00026].
- [206] V. B. . Klaer and G. D. Moore, *The dark-matter axion mass*, *JCAP* **11** (2017) 049 [1708.07521].
- [207] R. T. Co, L. J. Hall and K. Harigaya, *Predictions for Axion Couplings from ALP Cogenesis*, *JHEP* **01** (2021) 172 [2006.04809].
- [208] 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].
- [209] P. Arias, D. Cadamuro, M. Goodsell, J. Jaeckel, J. Redondo and A. Ringwald, *WISPy Cold Dark Matter*, *JCAP* **06** (2012) 013 [1201.5902].
- [210] C. A. J. O'Hare, G. Pierobon, J. Redondo and Y. Y. Y. Wong, *Simulations of axionlike particles in the postinflationary scenario*, *Phys. Rev. D* **105** (2022) 055025 [2112.05117].
- [211] C. A. J. O'Hare and E. Vitagliano, *Cornering the axion with CP-violating interactions*, *Phys. Rev. D* **102** (2020) 115026 [2010.03889].
- [212] E. Hardy and R. Lasenby, *Stellar cooling bounds on new light particles: plasma mixing effects*, *JHEP* **02** (2017) 033 [1611.05852].
- [213] J. Berg , P. Brax, G. M tris, M. Pernot-Borr s, 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].
- [214] 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.
- [215] 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].
- [216] 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  $\mu\text{m}$* , *Phys. Rev. Lett.* **124** (2020) 101101 [2002.11761].
- [217] 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.
- [218] 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.
- [219] 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.
- [220] 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.
- [221] W.-H. Tan et al., *Improvement for Testing the Gravitational Inverse-Square Law at the Submillimeter Range*, *Phys. Rev. Lett.* **124** (2020) 051301.
- [222] W.-H. Tan et al., *New Test of the Gravitational Inverse-Square Law at the Submillimeter Range with Dual Modulation and Compensation*, *Phys. Rev. Lett.* **116** (2016) 131101.
- [223] 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].
- [224] 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].
- [225] 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].
- [226] 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.
- [227] J. Lee, A. Almasi and M. Romalis, *Improved Limits on Spin-Mass Interactions*, *Phys. Rev. Lett.* **120** (2018) 161801 [1801.02757].
- [228] 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].
- [229] 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].
- [230] 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].
- [231] 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.



- [232] XENON Collaboration, E. Aprile et al., *Light Dark Matter Search with Ionization Signals in XENON1T*, *Phys. Rev. Lett.* **123** (2019) 251801 [[1907.11485](#)].
- [233] 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.
- [234] 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](#)].
- [235] K. Tullney et al., *Constraints on Spin-Dependent Short-Range Interaction between Nucleons*, *Phys. Rev. Lett.* **111** (2013) 100801 [[1303.6612](#)].
- [236] A. Arvanitaki and A. A. Geraci, *Resonantly Detecting Axion-Mediated Forces with Nuclear Magnetic Resonance*, *Phys. Rev. Lett.* **113** (2014) 161801 [[1403.1290](#)].
- [237] A. Hees, O. Minazzoli, E. Savalle, Y. V. Stadnik and P. Wolf, *Violation of the equivalence principle from light scalar dark matter*, *Phys. Rev. D* **98** (2018) 064051 [[1807.04512](#)].
- [238] A. Arvanitaki, S. Dimopoulos and K. Van Tilburg, *Sound of Dark Matter: Searching for Light Scalars with Resonant-Mass Detectors*, *Phys. Rev. Lett.* **116** (2016) 031102 [[1508.01798](#)].
- [239] A. Branca et al., *Search for an Ultralight Scalar Dark Matter Candidate with the AURIGA Detector*, *Phys. Rev. Lett.* **118** (2017) 021302 [[1607.07327](#)].
- [240] BACON Collaboration, K. Beloy et al., *Frequency Ratio Measurements with 18-digit Accuracy Using a Network of Optical Clocks*, [2005.14694](#).
- [241] O. Tretiak, X. Zhang, N. L. Figueroa, D. Antypas, A. Brogna, A. Banerjee, G. Perez and D. Budker, *Improved Bounds on Ultralight Scalar Dark Matter in the Radio-Frequency Range*, *Phys. Rev. Lett.* **129** (2022) 031301 [[2201.02042](#)].
- [242] E. Savalle, A. Hees, F. Frank, E. Cantin, P.-E. Pottie, B. M. Roberts, L. Cros, B. T. Mcallister and P. Wolf, *Searching for Dark Matter with an Optical Cavity and an Unequal-Delay Interferometer*, *Phys. Rev. Lett.* **126** (2021) 051301 [[2006.07055](#)].
- [243] K. Van Tilburg, N. Leefer, L. Bougas and D. Budker, *Search for ultralight scalar dark matter with atomic spectroscopy*, *Phys. Rev. Lett.* **115** (2015) 011802 [[1503.06886](#)].
- [244] S. Aharony, N. Akerman, R. Ozeri, G. Perez, I. Savoray and R. Shaniv, *Constraining Rapidly Oscillating Scalar Dark Matter Using Dynamic Decoupling*, *Phys. Rev. D* **103** (2021) 075017 [[1902.02788](#)].
- [245] S. M. Vermeulen et al., *Direct limits for scalar field dark matter from a gravitational-wave detector*, *Nature* **600** (2021) 424 [[2103.03783](#)].
- [246] L. Aiello, J. W. Richardson, S. M. Vermeulen, H. Grote, C. Hogan, O. Kwon and C. Stoughton, *Constraints on Scalar Field Dark Matter from Colocated Michelson Interferometers*, *Phys. Rev. Lett.* **128** (2022) 121101 [[2108.04746](#)].
- [247] W. M. Campbell, B. T. McAllister, M. Goryachev, E. N. Ivanov and M. E. Tobar, *Searching for Scalar Dark Matter via Coupling to Fundamental Constants with Photonic, Atomic and Mechanical Oscillators*, *Phys. Rev. Lett.* **126** (2021) 071301 [[2010.08107](#)].
- [248] M. Filzinger, S. Dörscher, R. Lange, J. Klose, M. Steinell, E. Benkler, E. Peik, C. Lisdat and N. Huntemann, *Improved limits on the coupling of ultralight bosonic dark matter to photons from optical atomic clock comparisons*, [2301.03433](#).
- [249] R. Oswald et al., *Search for Dark-Matter-Induced Oscillations of Fundamental Constants Using Molecular Spectroscopy*, *Phys. Rev. Lett.* **129** (2022) 031302 [[2111.06883](#)].
- [250] A. Hees, J. Guéna, M. Abgrall, S. Bize and P. Wolf, *Searching for an oscillating massive scalar field as a dark matter candidate using atomic hyperfine frequency comparisons*, *Phys. Rev. Lett.* **117** (2016) 061301 [[1604.08514](#)].
- [251] C. J. Kennedy, E. Oelker, J. M. Robinson, T. Bothwell, D. Kedar, W. R. Milner, G. E. Marti, A. Derevianko and J. Ye, *Precision Metrology Meets Cosmology: Improved Constraints on Ultralight Dark Matter from Atom-Cavity Frequency Comparisons*, *Phys. Rev. Lett.* **125** (2020) 201302 [[2008.08773](#)].
- [252] L. Badurina, O. Buchmueller, J. Ellis, M. Lewicki, C. McCabe and V. Vaskonen, *Prospective sensitivities of atom interferometers to gravitational waves and ultralight dark matter*, *Phil. Trans. A. Math. Phys. Eng. Sci.* **380** (2021) 20210060 [[2108.02468](#)].
- [253] MAGIS-100 Collaboration, M. Abe et al., *Matter-wave Atomic Gradiometer Interferometric Sensor (MAGIS-100)*, *Quantum Sci. Technol.* **6** (2021) 044003 [[2104.02835](#)].
- [254] D. Antypas et al., *New Horizons: Scalar and Vector Ultralight Dark Matter*, [2203.14915](#).
- [255] J. Manley, D. Wilson, R. Stump, D. Grin and S. Singh, *Searching for Scalar Dark Matter with Compact Mechanical Resonators*, *Phys. Rev. Lett.* **124** (2020) 151301 [[1910.07574](#)].
- [256] A. A. Geraci, C. Bradley, D. Gao, J. Weinstein and A. Derevianko, *Searching for Ultralight Dark Matter with Optical Cavities*, *Phys. Rev. Lett.* **123** (2019) 031304 [[1808.00540](#)].
- [257] I. Kozryyev, Z. Lasner and J. M. Doyle, *Enhanced sensitivity to ultralight bosonic dark matter in the spectra of the linear radical SrOH*, *Phys. Rev. A* **103** (2021) 043313 [[1805.08185](#)].
- [258] D. E. Kaplan, A. Mitridate and T. Trickle, *Constraining fundamental constant variations from ultralight dark matter with pulsar timing arrays*, *Phys. Rev. D* **106** (2022) 035032 [[2205.06817](#)].
- [259] M. Bordag, U. Mohideen and V. M. Mostepanenko, *New developments in the Casimir effect*, *Phys. Rept.* **353** (2001) 1 [[quant-ph/0106045](#)].

- [260] R. S. Decca, D. Lopez, H. B. Chan, E. Fischbach, D. E. Krause and C. R. Jamell, *Constraining new forces in the Casimir regime using the isoelectronic technique*, *Phys. Rev. Lett.* **94** (2005) 240401 [[hep-ph/0502025](#)].
- [261] A. O. Sushkov, W. J. Kim, D. A. R. Dalvit and S. K. Lamoreaux, *New Experimental Limits on Non-Newtonian Forces in the Micrometer Range*, *Phys. Rev. Lett.* **107** (2011) 171101 [[1108.2547](#)].
- [262] E. G. Adelberger, J. H. Gundlach, B. R. Heckel, S. Hoedl and S. Schlamminger, *Torsion balance experiments: A low-energy frontier of particle physics*, *Prog. Part. Nucl. Phys.* **62** (2009) 102.
- [263] MICROSCOPE Collaboration, P. Touboul et al., *MICROSCOPE Mission: Final Results of the Test of the Equivalence Principle*, *Phys. Rev. Lett.* **129** (2022) 121102 [[2209.15487](#)].
- [264] E. J. Chun and S. Yun, *Particle dispersion in the classical vector dark matter background*, *Phys. Rev. D* **106** (2022) 095027 [[2205.03617](#)].
- [265] E. A. Shaw, M. P. Ross, C. A. Hagedorn, E. G. Adelberger and J. H. Gundlach, *Torsion-balance search for ultralow-mass bosonic dark matter*, *Phys. Rev. D* **105** (2022) 042007 [[2109.08822](#)].
- [266] LIGO SCIENTIFIC, KAGRA, VIRGO Collaboration, R. Abbott et al., *Constraints on dark photon dark matter using data from LIGO's and Virgo's third observing run*, *Phys. Rev. D* **105** (2022) 063030 [[2105.13085](#)].
- [267] M. A. Fedderke and A. Mathur, *Asteroids for ultralight dark-photon dark-matter detection*, [2210.09324](#).
- [268] J. Manley, M. D. Chowdhury, D. Grin, S. Singh and D. J. Wilson, *Searching for vector dark matter with an optomechanical accelerometer*, *Phys. Rev. Lett.* **126** (2021) 061301 [[2007.04899](#)].
- [269] P. W. Graham, D. E. Kaplan, J. Mardon, S. Rajendran and W. A. Terrano, *Dark Matter Direct Detection with Accelerometers*, *Phys. Rev. D* **93** (2016) 075029 [[1512.06165](#)].
- [270] A. Caputo, A. J. Millar, C. A. J. O'Hare and E. Vitagliano, *Dark photon limits: A handbook*, *Phys. Rev. D* **104** (2021) 095029 [[2105.04565](#)].
- [271] A. S. Goldhaber and M. M. Nieto, *Photon and Graviton Mass Limits*, *Rev. Mod. Phys.* **82** (2010) 939 [[0809.1003](#)].
- [272] 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.
- [273] D. F. Bartlett and S. Loegl, *Limits on an Electromagnetic Fifth Force*, *Phys. Rev. Lett.* **61** (1988) 2285.
- [274] L.-C. Tu, J. Luo and G. T. Gillies, *The Mass of the Photon*, *Rept. Prog. Phys.* **68** (2005) 77.
- [275] 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](#)].
- [276] S. J. Plimpton and W. E. Lawton, *A Very Accurate Test of Coulomb's Law of Force Between Charges*, *Phys. Rev.* **50** (1936) 1066.
- [277] 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](#)].
- [278] A. S. Goldhaber and M. M. Nieto, *Terrestrial and Extra-Terrestrial Limits on the Photon Mass*, *Rev. Mod. Phys.* **43** (1971) 277.
- [279] E. Fischbach, H. Kloor, R. A. Langel, A. T. Y. Liu and M. Peredo, *New geomagnetic limits on the photon mass and on long range forces coexisting with electromagnetism*, *Phys. Rev. Lett.* **73** (1994) 514.
- [280] G. Marocco, *Dark photon limits from magnetic fields and astrophysical plasmas*, [2110.02875](#).
- [281] 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.
- [282] 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](#)].
- [283] 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](#)].
- [284] 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](#)].
- [285] ADMX Collaboration, A. Wagner et al., *A Search for Hidden Sector Photons with ADMX*, *Phys. Rev. Lett.* **105** (2010) 171801 [[1007.3766](#)].
- [286] A. Romanenko et al., *New Exclusion Limit for Dark Photons from an SRF Cavity-Based Search (Dark SRF)*, [2301.11512](#).
- [287] M. Danilov, S. Demidov and D. Gorbunov, *Constraints on Hidden Photons Produced in Nuclear Reactors*, *Phys. Rev. Lett.* **122** (2019) 041801 [[1804.10777](#)].
- [288] 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](#)].
- [289] 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](#)].
- [290] J. Redondo, *Helioscope Bounds on Hidden Sector Photons*, *JCAP* **07** (2008) 008 [[0801.1527](#)].

- [291] 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](#)].
- [292] J. Frerick, F. Kahlhoefer and K. Schmidt-Hoberg, *A' view of the sunrise: Boosting helioscopes with angular information*, [2211.00022](#).
- [293] J. Redondo and G. Raffelt, *Solar Constraints on Hidden Photons Re-visited*, *JCAP* **08** (2013) 034 [[1305.2920](#)].
- [294] 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](#)].
- [295] 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](#)].
- [296] (XENON COLLABORATION)§, XENON Collaboration, E. Aprile et al., *Emission of single and few electrons in XENON1T and limits on light dark matter*, *Phys. Rev. D* **106** (2022) 022001 [[2112.12116](#)].
- [297] S. D. McDermott and S. J. Witte, *Cosmological Evolution of Light Dark Photon Dark Matter*, *Phys. Rev. D* **101** (2020) 063030 [[1911.05086](#)].
- [298] 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](#)].
- [299] 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](#)].
- [300] S. Dubovsky and G. Hernández-Chifflet, *Heating up the Galaxy with Hidden Photons*, *JCAP* **12** (2015) 054 [[1509.00039](#)].
- [301] D. Wadekar and G. R. Farrar, *Gas-rich dwarf galaxies as a new probe of dark matter interactions with ordinary matter*, *Phys. Rev. D* **103** (2021) 123028 [[1903.12190](#)].
- [302] 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](#)].
- [303] 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](#)].
- [304] B. Godfrey et al., *Search for dark photon dark matter: Dark E field radio pilot experiment*, *Phys. Rev. D* **104** (2021) 012013 [[2101.02805](#)].
- [305] 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](#)].
- [306] DOSUE-RR Collaboration, S. Kotaka et al., *Search for dark photon cold dark matter in the mass range 74–110  $\mu\text{eV}/c^2$  with a cryogenic millimeter-wave receiver*, [2205.03679](#).
- [307] H. An, S. Ge, W.-Q. Guo, X. Huang, J. Liu and Z. Lu, *Direct detection of dark photon dark matter using radio telescopes*, [2207.05767](#).
- [308] 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](#)].
- [309] J. Chiles et al., *New Constraints on Dark Photon Dark Matter with Superconducting Nanowire Detectors in an Optical Haloscope*, *Phys. Rev. Lett.* **128** (2022) 231802 [[2110.01582](#)].
- [310] H. An, X. Chen, S. Ge, J. Liu and Y. Luo, *Searching for Ultralight Dark Matter Conversion in Solar Corona using LOFAR Data*, [2301.03622](#).
- [311] L. Manenti et al., *Search for dark photons using a multilayer dielectric haloscope equipped with a single-photon avalanche diode*, *Phys. Rev. D* **105** (2022) 052010 [[2110.10497](#)].
- [312] B. T. McAllister, A. Quiskamp, C. O'Hare, P. Altin, E. Ivanov, M. Goryachev and M. Tobar, *Limits on Dark Photons, Scalars, and Axion-Electromagnetodynamics with The ORGAN Experiment*, [2212.01971](#).
- [313] R. Cervantes et al., *Search for 70  $\mu\text{eV}$  Dark Photon Dark Matter with a Dielectrically Loaded Multiwavelength Microwave Cavity*, *Phys. Rev. Lett.* **129** (2022) 201301 [[2204.03818](#)].
- [314] K. Ramanathan, N. Klimovich, R. Basu Thakur, B. H. Eom, H. G. LeDuc, S. Shu, A. D. Beyer and P. K. Day, *Wideband Direct Detection Constraints on Hidden Photon Dark Matter with the QUALIPHIDE Experiment*, [2209.03419](#).
- [315] X. Fan, G. Gabrielse, P. W. Graham, R. Harnik, T. G. Myers, H. Ramani, B. A. D. Sukra, S. S. Y. Wong and Y. Xiao, *One-Electron Quantum Cyclotron as a Milli-eV Dark-Photon Detector*, *Phys. Rev. Lett.* **129** (2022) 261801 [[2208.06519](#)].
- [316] 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](#)].
- [317] 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](#)].
- [318] 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)].

- [319] 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*, *Phys. Rev. D* **104** (2021) 095032 [2108.08852].
- [320] M. A. Fedderke, P. W. Graham, D. F. J. Kimball and S. Kalia, *Earth as a transducer for dark-photon dark-matter detection*, *Phys. Rev. D* **104** (2021) 075023 [2106.00022].
- [321] 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].
- [322] R. Cervantes, C. Braggio, B. Giaccone, D. Frolov, A. Grasselino, R. Harnik, O. Melnychuk, R. Pilipenko, S. Posen and A. Romanenko, *Deepest Sensitivity to Wavelike Dark Photon Dark Matter with SRF Cavities*, **2208.03183**.
- [323] 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].
- [324] 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].
- [325] 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].
- [326] 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].
- [327] XENON Collaboration, E. Aprile et al., *Excess Electronic Recoil Events in XENON1T*, *Phys. Rev. D* **102** (2020) 072004 [2006.09721].
- [328] 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].
- [329] H. An, M. Pospelov, J. Pradler and A. Ritz, *New Limits on Dark Photons from Solar Emission and keV Scale Dark Matter*, *Phys. Rev. D* **102** (2020) 115022 [2006.13929].