

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]
- DANCE [17]
- BASE [18]
- GrAHal [19]
- HAYSTAC [20, 21, 22]
- LIDA [23]
- ORGAN [24, 25]
- QUAX [26, 27, 28]
- RADES [29]
- RBF [30]
- SHAFT [31]
- TASEH [32]
- SuperMAG [33]
- UF [34]
- UPLOAD-DOWNLOAD [35, 36]
- ABRACADABRA (projection) [37]
- ADBC (projection) [38]
- ADMX (projection) [39]
- aLIGO (projection) [40]
- ALPHA (projection) [41, 42]
- BRASS (projection) [43]
- BREAD (projection) [44]
- CADEX (projection) [45]
- DALI (projection) [46]
- DM-Radio (projection) [47, 48]
- DANCE (projection) [49]
- LAMPOST (projection) [50]
- MADMAX (projection) [51]
- FLASH (projection) [52, 53]
- QUAX (projection) [54]
- ORGAN (projection) [24]
- TOORAD (projection) [55]
- Twisted Anyon Cavity (projection) [56]
- WISPLC (projection) [57]
- WISPMI (projection) [58]
- SRF heterodyne cavity (projection) [59]

LSW/Helioscopes

- ALPS [60]
- CAST [61, 62]
- CROWS [63]
- OSQAR [64]
- PVLAS [65]
- SAPPHIRES [66, 67]
- ALPS-II (projection) [68]
- IAXO (projection) [69]
- IAXO (Galactic SN) [70]

Astro

- Axion star explosions [71]
- Betelgeuse [72]
- BICEP/KECK [73]
- Breakthrough Listen (Doppler shifted radio line in MW) [74]
- Bullet Cluster (archival radio data) [75]
- Cosmic IR background (hint) [76]
- Chandra (Hydra) [77]
- Chandra (M87) [78]
- Chandra (NGC 1275) [79]
- Chandra (H1821+643) [80]
- CMB Anisotropies [81, 82]
- COBE/FIRAS+Planck spectral dist. [83]
- Diffuse gamma-rays [84]
- Diffuse SN ALPs [85] (see also [86])
- Distance ladder [87]
- Fermi-LAT (NGC 1275) [88]

- Fermi-LAT (Extragalactic SNe) [89]
- Fermi-LAT (Quasars) [90]
- Gamma-ray attenuation (ALP dark matter) [91]
- Globular clusters (R parameter) [92]
- Globular clusters (R_2 parameter) [93]
- HAWC (TeV Blazars) [94]
- HESS (PKS 2155-304) [95]
- INTEGRAL (ALP decay) [96]
- Leo T gas temperature [97]
- Magnetic white dwarfs (X-rays) [98]
- Magnetic white dwarf (polarization) [99]
- MOJAVE [100]
- Mrk 421 (ARGO-YBJ+Fermi): [101]
- Mrk 421 (ARGO-YBJ)+MAGIC: [102]
- Neutron Stars (Foster et al. 2020) [103]
- Neutron Stars (Darling 2020) [104]
- Neutron Stars (Battye et al. 2021) [105]
- Neutron stars (Foster et al. 2022) [106]
- Neutron Stars (Battye et al. 2023) [107]
- NuSTAR (decaying dark matter, recast from Sterile ν) [108, 109, 110]
- Planck cosmic birefringence [111]
- POLARBEAR [112]
- PPTA+QUIJOTE [113]
- Pulsar polarisation arrays (projection) [114]
- Pulsar polar cap [115]
- Red supergiant [116]
- Solar neutrinos [117]
- SN1987A- γ (ALP decay) [118, 119, 120]
- SN1987A- γ (low mass ALP conversion) [121, 119]
- SN1987A- γ, ν (high mass ALPs) [122, 123, 84]
- SN1987A (PVO) [124]
- Low-energy supernovae (ALP decay) [84]
- Solar basin (NuSTAR) [125]
- Solar basin (NuSTAR and SPHINX) [126]
- Star clusters [127]
- SPT [128]
- Telescopes (Haystack) [129]
- Telescopes (MUSE) [130]
- Telescopes (VIMOS) [131]
- Telescopes (HST) [132, 133]
- Fermi galactic SN (projection) [134]
- THESEUS (projection) [135]
- WINERED (projection) [136]
- eROSITA (projection) [137]
- White dwarf initial-final mass relation [138]
- XMM-Newton (decaying DM ALPs) [139]

Cosmology

- Ionisation fraction, EBL, X-rays [140]
- BBN+ N_{eff} [141]
- Freeze in [142]

2 Heavy ALP-photon coupling

- ATALS (PbPb) [143]
- BaBar [144]
- Beam dump [145, 146, 144, 147, 148]
- Belle II [149]
- BESIII [150]
- CMS (PbPb) [151]
- LEP [152]
- LHC (pp)[153]
- MiniBooNE [154]
- NOMAD [155]
- OPAL [153]
- PrimEx [156, 157]
- CONUS (projection) [158]
- DUNE (projection) [159]
- FASER LLP (projection) [160]

3 Axion-electron

- EDELWEISS [161]
- Magnon non-demolition [162]
- DarkSide-50 [163]
- GERDA [164]
- LUX [165]
- Panda-X [166]
- SuperCDMS [167]
- XENON1T [168, 169]
- XENONnT [170]
- XENON1T (Solar basin) [171]
- Red giants (ω Cen) [172]
- NV Centers (projection) [173]
- Solar neutrinos [174]
- Magnons (projection) [175]
- Polaritons (projection) [176]
- DARWIN (projection) [177]
- LZ (projection) [178]
- QUAX [179, 180]
- Semiconductors (projection) [181]
- White dwarf hint [182]
- Freeze-in irreducible axions [142]
- X-rays (1-loop decay) [183]

4 Axion-nucleon

Note: CASPER and nEDM limits account for stochastic correction reported in [184]

- Casimir effect (fifth force) [185]
- CASPER-ZULF-Comagnetometer [186]
- CASPER-ZULF-Sidechain [187]
- ChangE [188]
- Hefei Spin-based amplifiers [189]
- nEDM (ultracold neutrons and mercury) [190]
- NASDUCK [191, 192]
- PSI HgM (nEDM) [193]
- K-3He comagnetometer (fifth force) [194]
- K-3He comagnetometer (dark matter) [195]
- JEDI [196]
- Old comagnetometers [197]
- Torsion balance [198]
- Neutron star cooling [199] (corrected from [200])
- SN1987A Cooling [201, 202]
- SNO (deuterium dissasociation) [203]
- Proton storage ring (projection) [204]
- Electrostatic storage ring (projection) [205]
- DM comagnetometer (projection) [197]
- CASPER-gradient (projection) [187]
- Superfluid helium-3 HPD (projection) [206]

5 Axion-EDM

- Axinovae [207]
- Beam EDM [208]
- BBN (dark matter) [209]
- CASPER-electric [210]
- nEDM [190]
- HfF^+ [211]
- JEDI [196]
- Rb/Quartz [212]
- SN1987A [213]
- *Planck*+BAO thermal axion bound [214]
- CASPER-electric (projection) [215]
- Storage Ring EDM (projection) [215]

6 Axion mass versus f_a

- BBN (dark matter) [209]
- Beam EDM [208]
- Binary pulsars and Solar core constraint on $\bar{\theta}$ [216]. I include minor numerical corrections made by [217, 218].
- GW170817 [219]
- HfF^+ [211]
- Rb/Quartz [212]
- JEDI [196]
- nEDM [190]
- Piezoaxionic effect (projection) [220]
- *Planck*+BAO thermal axion bound [214]
- SN1987A [213]
- Neutron stars (projection) [216].
- NS-NS and NS-BH Inspirals (projection) [216].
- White dwarfs [221]

6.1 Black hole superradiance

- Baryakhtar et al. [222] (just Stellar mass BHs)
- Mehta et al. [222] (Stellar mass and SMBHs)
- Stott [223]
- Ünal et al. [224] (Quasars)
- Cardoso et al. [225] (dark photon)

7 Axion theory predictions

7.1 Post-inflation QCD axion

- Ballesteros et al. [226]
- Buschmann et al. 2020 [227]
- Buschmann et al. 2021 [228]
- Bonati et al. [229]
- Borsanyi et al. [230]
- Berkowitz et al. [231]
- Dine et al. [232]
- Petreczky et al. [233]
- Fleury & Moore [234]
- Klaer & Moore [235]
- Gorghetto et al. [236]
- Saikawa et al. [69]

7.2 Other dark matter predictions

- ALP Cogenesis [237]
- Early matter domination [238]
- Post-inflation ALP misalignment [239, 240]
- Trapped misalignment (\mathcal{Z}_N axion) [217]

8 CP-violating couplings

Combined constraints [241]

Scalar-nucleon

- Red giants [242]
- MICROSCOPE [243].
- Eot-Wash [244, 245, 246]
- Irvine [247]. Corrected to 2σ limit by [248]
- HUST [249, 250, 251, 252].
- Stanford [253]
- IUPUI [254].
- Wuhan [248]

Pseudoscalar-electron

- Red giants [242]
- Eot-wash [255]
- NIST [256]
- SMILE [257].
- QUAX [258, 259, 260]
- Washington [261, 262].
- XENON1T [263]
- Magnon (projection) [176]
- QUAX (projection) [258].

Pseudoscalar-nucleon

- Neutron star cooling [199]
- Hefei (Earth) [264]
- Hefei (mm) [265]
- Washington [266]. Limit taken from [267].
- SMILE [257].
- Mainz [268]
- Moon/Sun [269]
- ARIADNE (projection) [270]
- CASPER-wind (projection) [215]
- DM comagnetometer (projection) [197]
- Fifth force Ne-Rb-K comagnetometer (projection) [271]

9 Scalars

Scalar-photon

- Globular clusters [93]
- Eot-Wash (EP) [272]
- Fifth force [273, 274, 275, 276]
- MICROSCOPE [243]
- AURIGA [277]
- BACON [278]
- Cs/Cav [279]
- DAMNED [280]
- Dy/Dy [281]
- Dy/Quartz [212]
- Dynamic Decoupling [282]
- GEO600 [283]
- LIGO O3 [284]
- Holometer [285]
- H/Quartz/Sapphire [286]
- PTB (Yb+, Sr clock) [287]
- I₂ [288]
- Rb/Cs [289]
- Sr/Si [290]
- Yb/Sr [291]
- AEDGE (projection) [292]
- AION (projection) [292]
- DUAL (projection) [293]
- MAGIS (projection) [294]
- Nuclear clock (projection) [295]
- Mechanical Resonators (projection) [296]

Scalar-electron

- Red giants [242]
- White dwarfs [297]
- Eot-Wash (EP) [272]
- Fifth force [273, 274, 275, 276]
- MICROSCOPE [243]
- AURIGA [277]
- Cs/Cav [279]
- DAMNED [280]
- GEO600 [283]
- Holometer [285]
- H/Quartz/Sapphire [286]
- I₂ [288]
- H/Si [290]
- Rb/Quartz [212]
- Yb/Cs [298]
- LIGO O3 [284]
- NANOGrav 15-year PTA [299]
- FOCOS (nuclear clock projection) [300]
- AEDGE (projection) [292]
- AION (projection) [292]
- DUAL (projection) [293]
- Optical microwave clock (projection) [301]
- Optical cavities [302]
- SrOH [303]
- Mechanical Resonators (projection) [296]
- IPTA (mock data) [304]

10 Vectors

B-L coupling

- Casimir [305, 306, 307]
- Eot-Wash (EP) [308]
- Eot-Wash (ISL) [309]
- MICROSCOPE [310]
- DM stability [311]
- Horizontal branch [242]
- Sun [242]
- Eot-Wash (DM) [312]
- LIGO (O1) [313]
- LIGO/VIRGO [313]
- LISA Pathfinder [314]
- PPTA [315]
- Asteroids (projection) [316]
- LISA (projection) [316]
- MAGIS (projection) [294]
- Optomechanical membranes (projection) [317]
- SKA (projection) [318]
- Torsion balance (projection) [318]
- STE-QUEST (projection) [319]

11 Dark photons

Combined constraints [320]

SM photon-DP transitions

- Coulomb [321, 322, 323, 324, 325],
- Plimpton & Lawton's experiment [326, 325]
- Atomic spectroscopy [327]
- Atomic force microscopy (AFM) [325]
- Static magnetic field of the Earth [328, 329, 330]
- Static magnetic field of Jupiter [331, 330].
- ALPs [60]
- ALPS-II (projection) [332]
- SPring-8 [333]
- UWA-LSW [334, 335]
- ADMX-LSW [336]
- CROWS [63].
- DarkSRF [337]
- DarkSRF (projection) [338]
- TEXONO [339]
- Crab nebula [340]
- COBE and FIRAS [341]
- STAX (projection) [342]

Production in stars

- CAST [343]
- SHIPS [344]
- HINODE [345]
- New globular cluster bound [346]
- Old stellar bounds: Solar-L, HB and RG stars [347] (see also [348])
- Neutron stars [349]
- Solar neutrinos [350]
- XENON1T [351]

Dark matter cosmology/astro

- Arias et al. [239]
- Witte et al. [352, 353]
- Caputo et al. [354, 341],
- ISM [355],
- Leo T dwarf [356]
- Gas clouds [356, 357]

Dark matter experiments

- Reinterpreted axion limits [320]
- ALPHA [42]
- AMAILS [358]
- BRASS-p [359]
- BREAD (projection) [44]
- DarkSide-50 [163]
- DAMIC [360]
- Dark E-field Radio [361]
- DM Pathfinder [362]
- DOSUE-RR [363]
- FAST Radio antenna [364]
- FUNK [365]
- LAMPOST [366]
- LOFAR (solar corona) [367]
- MuDHI [368]
- ORGAN [369]
- ORPHEUS [370]
- QUALIPHIDE [371]
- Quantum cyclotron [372]
- SENSEI [373]
- SHUKET [374]
- SuperCDMS [375]
- SuperMAG [376, 377]
- SQuAD [378],
- SQMS [379],
- SRF scanning [380]
- Tokyo dish antennae experiments [381, 382, 383]
- WISPDMS [384]
- XENON(100,1T,nT) [181, 263, 385, 386, 351, 387].

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