

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, 16, 17]
- CAST-CAPP [18]
- DANCE [19]
- BASE [20]
- GrAHal [21]
- HAYSTAC [22, 23, 24]
- LIDA [25]
- ORGAN [26, 27, 28]
- QUAX [29, 30, 31, 32]
- RADES [33]
- RBF [34]
- SHAFT [35]
- TASEH [36]
- SuperMAG [37]
- UF [38]
- UPLOAD-DOWNLOAD [39, 40]
- ABRACADABRA (projection) [41]
- ADBC (projection) [42]
- ADMX (projection) [43]
- aLIGO (projection) [44]
- ALPHA (projection) [45, 46]
- BabyIAXO-RADES (projection) [47]
- BRASS (projection) [48]
- BREAD (projection) [49]
- CADEX (projection) [50]
- DALI (projection) [51]
- DM-Radio (projection) [52, 53]
- DANCE (projection) [54]
- LAMPOST (projection) [55]
- MADMAX (projection) [56]
- FLASH (projection) [57, 58]
- QUAX (projection) [59]
- ORGAN (projection) [26]
- TOORAD (projection) [60]
- Twisted Anyon Cavity (projection) [61]
- WISPLC (projection) [62]
- SRF heterodyne cavity (projection) [63]

LSW/Helioscopes

- ALPS [64]
- CAST [65, 66]
- CROWS [67]
- OSQAR [68]
- PVLAS [69]
- SAPPHIRES [70, 71]
- ALPS-II (projection) [72]
- IAXO (projection) [73]
- IAXO (Galactic SN) [74]
- WISPII (projection) [75]

Astro

- Axion star explosions [76]
- Betelgeuse [77]
- BICEP/KECK [78]
- Black hole polarimetry [79]
- Breakthrough Listen (Doppler shifted radio line in MW) [80]
- Bullet Cluster (archival radio data) [81]
- Cosmic IR background (hint) [82]
- Chandra (Hydra) [83]
- Chandra (M87) [84]
- Chandra (NG7 1275) [85]
- Chandra (H1821+643) [86]
- CMB Anisotropies [87, 88]
- COBE/FIRAS+Planck spectral dist. [89]
- Diffuse gamma-rays [90]
- Diffuse SN ALPs [91] (see also [92])

- Distance ladder [93]
- Fermi-LAT (NGC 1275) [94]
- Fermi-LAT (Extragalactic SNe) [95]
- Fermi-LAT (Quasars) [96]
- Gamma-ray attenuation (ALP dark matter) [97]
- Globular clusters (R parameter) [98]
- Globular clusters (R_2 parameter) [99]
- HAWC (TeV Blazars) [100]
- HESS (PKS 2155-304) [101]
- INTEGRAL (ALP decay) [102]
- Leo T gas temperature [103]
- MAGIC (Perseus galaxy cluster) [104]
- Magnetic white dwarfs (X-rays) [105]
- Magnetic white dwarf (polarization) [106]
- MOJAVE [107]
- Mrk 421 (ARGO-YBJ+Fermi): [108]
- Mrk 421 (ARGO-YBJ+MAGIC): [109]
- Neutron Stars (Foster et al. 2020) [110]
- Neutron Stars (Darling 2020) [111]
- Neutron Stars (Battye et al. 2021) [112]
- Neutron stars (Foster et al. 2022) [113]
- Neutron Stars (Battye et al. 2023) [114]
- NuSTAR (decaying dark matter, recast from Sterile nu) [115, 116, 117]
- Planck cosmic birefringence [118]
- POLARBEAR [119]
- PPTA+QUIJOTE [120]
- Pulsar polarisation arrays (projection) [121]
- Pulsar polar cap [122]
- Red supergiant [123]
- Solar neutrinos [124]
- Stellar axion background [125]
- SN1987A- γ (ALP decay) [126, 127, 128]
- SN1987A- γ (low mass ALP conversion) [129, 127]
- SN1987A- γ, ν (high mass ALPs) [130, 131, 90]
- SN1987A (PVO) [132]
- Low-energy supernovae (ALP decay) [90]
- Solar basin (NuSTAR) [133]
- Solar basin (NuSTAR and SPHINX) [134]
- Star clusters [135]
- SPT [136]
- Telescopes (Haystack) [137]
- Telescopes (MUSE) [138] (updated from: [139])
- Telescopes (VIMOS) [140]
- Telescopes (HST) [141, 142]
- Telescopes (JWST) [143]
- Fermi galactic SN (projection) [144]
- THESEUS (projection) [145]
- WINERED (projection) [146]
- eROSITA (projection) [147]
- White dwarf initial-final mass relation [148]
- XMM-Newton (decaying DM ALPs) [149]

Cosmology

- Ionisation fraction, EBL, X-rays [150]
- BBN+ N_{eff} [151]
- Freeze in [152]

2 Heavy ALP-photon coupling

- ATALS (PbPb) [153]
- BaBar [154]
- Beam dump [155, 156, 154, 157, 158]
- Belle II [159]
- BESIII [160]
- CMS (PbPb) [161]
- LEP [162]
- LHC (pp)[163]
- MiniBooNE [164]
- NOMAD [165]
- OPAL [163]
- PrimEx [166, 167]
- CONUS (projection) [168]
- DUNE (projection) [169]
- FASER LLP (projection) [170]

3 Axion-electron

- Electron g-2 [171]
- EDELWEISS [172]
- Fermionic axion interferometer [?]
- Magnon non-demolition [173]
- DarkSide-50 [174]
- GERDA [175]
- LUX [176]
- Old comagnetometers [177]
- Panda-X [178]
- Torsion pendulum (spin force) [179]
- Torsion pendulum (axion wind) [180]
- SuperCDMS [181]
- XENON1T [182, 183]
- XENONnT [184]
- XENON1T (Solar basin) [185]
- Red giants (ω Cen) [186]
- Solar neutrinos [187]
- Electron storage ring (projection) [188]
- Axion wind multilayer (projection) [189]
- Magnons (projection) [190]
- Polaritons (projection) [191]
- DARWIN (projection) [192]
- LZ (projection) [193]
- QUAX [194, 195]
- NV Centers (projection) [196]
- Superconductors (projection) [197]
- Semiconductors (projection) [198]
- Spin-orbit coupling (projection) [199]
- Torsion pendulum (projection) [200]
- YIG (projection) [190]
- White dwarf hint [201]
- Freeze-in irreducible axions [152]
- X-rays (1-loop decay) [202]

4 Axion-nucleon

Note: CASPER and nEDM limits account for stochastic correction reported in [203]

- Casimir effect (fifth force) [204]
- CASPER-ZULF-Comagnetometer [205]
- CASPER-ZULF-Sidechain [206]
- ChangE [207, 208]
- Hefei Spin-based amplifiers [209]
- nEDM (ultracold neutrons and mercury) [210]
- NASDUCK [211, 212]
- PSI HgM (nEDM) [213]
- K-3He comagnetometer (fifth force) [214]
- K-3He comagnetometer (dark matter) [215]
- JEDI [216]
- Old comagnetometers [177]
- Torsion balance [217]
- Neutron star cooling [218] (corrected from [219])
- SN1987A Cooling [220, 221]
- SNO (deuterium dissasociation) [222]
- Proton storage ring (projection) [223]
- Electrostatic storage ring (projection) [188]
- DM comagnetometer (projection) [177]
- CASPER-gradient (projection) [206]
- Superfluid helium-3 HPD (projection) [224]
- MnCO₃ (projection) [225]

5 Axion-EDM

- Axinovae [226]
- Beam EDM [227]
- BBN (dark matter) [228]
- CASPER-electric [229]
- nEDM [210]
- HfF⁺ [230]
- JEDI [216]
- Rb/Quartz [231]
- SN1987A [232]
- *Planck*+BAO thermal axion bound [233]
- CASPER-electric (projection) [234]
- Storage Ring EDM (projection) [234]
- Polarisation haloscope (projection) [235]

6 Axion-top

Axion-top coupling limits originally compiles in Ref. [236]

7 Axion mass versus f_a

- BBN (dark matter) [228]
- Beam EDM [227]
- Binary pulsars and Solar core constraint on $\bar{\theta}$ [237]. I include minor numerical corrections made by [238, 239].
- GW170817 [240]
- HfF⁺ [230]
- Rb/Quartz [231]
- JEDI [216]
- nEDM [210]
- Tritium decay [241]
- Piezoaxionic effect (projection) [242]
- *Planck*+BAO thermal axion bound [233]
- SN1987A [232]
- Neutron stars (projection) [237].
- NS-NS and NS-BH Inspirals (projection) [237].
- White dwarfs [243]
- Polarisation haloscope (projection) [235]

7.1 Black hole superradiance

- Baryakhtar et al. [244] (just Stellar mass BHs)
- Mehta et al. [244] (Stellar mass and SMBHs)
- Stott [245]
- Ünal et al. [246] (Quasars)
- Cardoso et al. [247] (dark photon)

8 Axion theory predictions

8.1 Post-inflation QCD axion

- Ballesteros et al. [248]
- Buschmann et al. 2020 [249]
- Buschmann et al. 2021 [250]
- Bonati et al. [251]
- Borsanyi et al. [252]
- Berkowitz et al. [253]
- Dine et al. [254]
- Petreczky et al. [255]
- Fleury & Moore [256]
- Klaer & Moore [257]
- Gorghetto et al. [258]
- Saikawa et al. [73]

8.2 Other dark matter predictions

- ALP Cogenesis [259]
- Early matter domination [260]
- Post-inflation ALP misalignment [261, 262]
- Trapped misalignment ($\mathcal{Z}_{\mathcal{N}}$ axion) [238]

9 CP-violating couplings

Combined constraints [263]

Scalar-nucleon

- Red giants [264]
- MICROSCOPE [265].
- Eot-Wash [266, 267, 268]
- Irvine [269]. Corrected to 2σ limit by [270]
- HUST [271, 272, 273, 274].
- Stanford [275]
- IUPUI [276].
- Wuhan [270]

Pseudoscalar-electron

- Red giants [264]
- Eot-wash [277]
- e^+e^- Penning trap [278]
- NIST [279]
- SMILE [280]
- QUAX [281, 282, 283]
- Washington [179, 284].
- XENON1T [285]
- ACME (projection) [286]
- Magnon (projection) [191]
- QUAX (projection) [281].

Pseudoscalar-nucleon

- Neutron star cooling [218]
- Hefei (Earth) [287]
- Hefei (mm) [288]
- Washington [289]. Limit taken from [290].
- SMILE [280].
- Mainz [291]
- Moon/Sun [292]
- Perihelion shift [293]
- Yb trap (projection) [286]
- ARIADNE (projection) [294]
- CASPEr-wind (projection) [234]
- DM comagnetometer (projection) [177]
- Fifth force Ne-Rb-K comagnetometer (projection) [295]

10 Scalars

Scalar-photon

- Globular clusters [99]
- Eot-Wash (EP) [296]
- Fifth force [297, 298, 299, 300]
- MICROSCOPE [265]
- AURIGA [301]
- BACON [302]
- Cs/Cav [303]
- DAMNED [304]
- Dy/Dy [305]
- Dy/Quartz [231]
- Dynamic Decoupling [306]
- GEO600 [307]
- LIGO O3 [308]
- Holometer [309]
- H/Quartz/Sapphire [310]
- PTB (Yb+, Sr clock) [311]
- I₂ [312]
- Rb/Cs [313]
- Sr/Si [314]
- Yb/Sr [315]
- AEDGE (projection) [316]
- AION (projection) [316]
- DUAL (projection) [317]
- MAGIS (projection) [318]
- Nuclear clock (projection) [319]
- Mechanical Resonators (projection) [320]

Scalar-electron

- Red giants [264]
- White dwarfs [321]
- Eot-Wash (EP) [296]
- Fifth force [297, 298, 299, 300]
- MICROSCOPE [265]
- AURIGA [301]
- Cavities [322]
- Cs/Cav [303]
- DAMNED [304]
- GEO600 [307]
- Holometer [309]
- H/Quartz/Sapphire [310]
- I₂ [312]
- H/Si [314]
- Rb/Quartz [231]
- Yb/Cs [323]
- LIGO O3 [308]
- NANOGrav 15-year PTA [324]
- FOCOS (nuclear clock projection) [325]
- AEDGE (projection) [316]
- AION (projection) [316]
- DUAL (projection) [317]
- HELIOS (projection) [326]
- Optical microwave clock (projection) [327]
- Optical cavities [328]
- SrOH [329]
- Mechanical Resonators (projection) [320]
- IPTA (mock data) [330]

11 Vectors

B-L coupling

- Casimir [331, 332, 333]
- Eot-Wash (EP) [334]
- Eot-Wash (ISL) [335]
- MICROSCOPE [336]
- DM stability [337]
- Horizontal branch [264]
- Sun [264]
- Eot-Wash (DM) [338]
- LIGO (O1) [339]
- LIGO/VIRGO [339]
- LISA Pathfinder [340, 341]
- PPTA [342]
- Asteroids (projection) [343]
- HELIOS (projection) [326]
- LISA (projection) [343]
- MAGIS (projection) [318]
- Optomechanical membranes (projection) [344]
- SKA (projection) [345]
- Torsion balance (projection) [345]
- STE-QUEST (projection) [346]

12 Dark photons

Combined constraints [347]

SM photon-DP transitions

- Coulomb [348, 349, 350, 351, 352],
- Plimpton & Lawton's experiment [353, 352]
- Atomic spectroscopy [354]
- Atomic force microscopy (AFM) [352]
- Static magnetic field of the Earth [355, 356, 357]
- Static magnetic field of Jupiter [358, 357].
- Jupiter B-field/Juno mission [359]
- ALPs [64]
- ALPS-II (projection) [360]
- SPring-8 [361]
- UWA-LSW [362, 363]
- ADMX-LSW [364]
- CROWS [67].
- DarkSRF [365]
- DarkSRF (projection) [366]
- TEXONO [367]
- Crab nebula [368]
- COBE and FIRAS [369]
- STAX (projection) [370]

Production in stars

- CAST [371]
- SHIPS [372]
- HINODE [373]
- IAXO (modified for longitudinal mode) [374]
- New globular cluster bound [375]
- Old stellar bounds: Solar-L, HB and RG stars [376] (see also [377])
- Neutron stars [378]
- Solar neutrinos [379]
- XENON1T [380]

Dark matter cosmology/astro

- Arias et al. [261]
- Witte et al. [381, 382]
- Caputo et al. [383, 369],
- ISM [384],
- Leo T dwarf [385]
- Gas clouds [385, 386]

Dark matter experiments

- Reinterpreted axion limits [347]
- ALPHA [46]
- AMAILS [387]
- BRASS-p [388]
- BREAD (projection) [49]
- Dandelion (projection) [?]
- DarkSide-50 [174]
- DAMIC [389]
- Dark E-field Radio [390]
- DM Pathfinder [391]
- DOSUE-RR [392, 393]
- FAST Radio antenna [394]
- FUNK [395]
- GigaBREAD [396]
- LAMPOST [397]
- LOFAR (solar corona) [398]
- MuDHI [399]
- ORGAN [400]
- ORPHEUS [401]
- QUALIPHIDE [402]
- Quantum cyclotron [403]
- SENSEI [404]
- SHUKET [405]
- SuperCDMS [406]
- SuperMAG [407, 408]
- SQuAD [409],
- SQMS [410],
- SUPAX [411]
- SRF scanning [412]
- Tokyo dish antennae experiments [413, 414, 415]
- WISPDMS [416]
- XENON(100,1T,nT) [417, 285, 418, 419, 380, 420].

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