

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]
- BabyIAXO-RADES (projection) [43]
- BRASS (projection) [44]
- BREAD (projection) [45]
- CADEX (projection) [46]
- DALI (projection) [47]
- DM-Radio (projection) [48, 49]
- DANCE (projection) [50]
- LAMPOST (projection) [51]
- MADMAX (projection) [52]
- FLASH (projection) [53, 54]
- QUAX (projection) [55]
- ORGAN (projection) [24]
- TOORAD (projection) [56]
- Twisted Anyon Cavity (projection) [57]
- WISPLC (projection) [58]
- WISPLC (projection) [59]
- SRF heterodyne cavity (projection) [60]

LSW/Helioscopes

- ALPS [61]
- CAST [62, 63]
- CROWS [64]
- OSQAR [65]
- PVLAS [66]
- SAPPHIRES [67, 68]
- ALPS-II (projection) [69]
- IAXO (projection) [70]
- IAXO (Galactic SN) [71]

Astro

- Axion star explosions [72]
- Betelgeuse [73]
- BICEP/KECK [74]
- Breakthrough Listen (Doppler shifted radio line in MW) [75]
- Bullet Cluster (archival radio data) [76]
- Cosmic IR background (hint) [77]
- Chandra (Hydra) [78]
- Chandra (M87) [79]
- Chandra (NG7 1275) [80]
- Chandra (H1821+643) [81]
- CMB Anisotropies [82, 83]
- COBE/FIRAS+Planck spectral dist. [84]
- Diffuse gamma-rays [85]
- Diffuse SN ALPs [86] (see also [87])
- Distance ladder [88]

- Fermi-LAT (NGC 1275) [89]
- Fermi-LAT (Extragalactic SNe) [90]
- Fermi-LAT (Quasars) [91]
- Gamma-ray attenuation (ALP dark matter) [92]
- Globular clusters (R parameter) [93]
- Globular clusters (R_2 parameter) [94]
- HAWC (TeV Blazars) [95]
- HESS (PKS 2155-304) [96]
- INTEGRAL (ALP decay) [97]
- Leo T gas temperature [98]
- Magnetic white dwarfs (X-rays) [99]
- Magnetic white dwarf (polarization) [100]
- MOJAVE [101]
- Mrk 421 (ARGO-YBJ+Fermi): [102]
- Mrk 421 (ARGO-YBJ+MAGIC): [103]
- Neutron Stars (Foster et al. 2020) [104]
- Neutron Stars (Darling 2020) [105]
- Neutron Stars (Battye et al. 2021) [106]
- Neutron stars (Foster et al. 2022) [107]
- Neutron Stars (Battye et al. 2023) [108]
- NuSTAR (decaying dark matter, recast from Sterile nu) [109, 110, 111]
- Planck cosmic birefringence [112]
- POLARBEAR [113]
- PPTA+QUIJOTE [114]
- Pulsar polarisation arrays (projection) [115]
- Pulsar polar cap [116]
- Red supergiant [117]
- Solar neutrinos [118]
- SN1987A- γ (ALP decay) [119, 120, 121]
- SN1987A- γ (low mass ALP conversion) [122, 120]
- SN1987A- γ, ν (high mass ALPs) [123, 124, 85]
- SN1987A (PVO) [125]
- Low-energy supernovae (ALP decay) [85]
- Solar basin (NuSTAR) [126]
- Solar basin (NuSTAR and SPHINX) [127]
- Star clusters [128]
- SPT [129]
- Telescopes (Haystack) [130]
- Telescopes (MUSE) [131]
- Telescopes (VIMOS) [132]
- Telescopes (HST) [133, 134]
- Fermi galactic SN (projection) [135]
- THESEUS (projection) [136]
- WINERED (projection) [137]
- eROSITA (projection) [138]
- White dwarf initial-final mass relation [139]
- XMM-Newton (decaying DM ALPs) [140]

Cosmology

- Ionisation fraction, EBL, X-rays [141]
- BBN+ N_{eff} [142]
- Freeze in [143]

2 Heavy ALP-photon coupling

- ATALS (PbPb) [144]
- BaBar [145]
- Beam dump [146, 147, 145, 148, 149]
- Belle II [150]
- BESIII [151]
- CMS (PbPb) [152]
- LEP [153]
- LHC (pp)[154]
- MiniBooNE [155]
- NOMAD [156]
- OPAL [154]
- PrimEx [157, 158]
- CONUS (projection) [159]
- DUNE (projection) [160]
- FASER LLP (projection) [161]

3 Axion-electron

- EDELWEISS [162]
- Magnon non-demolition [163]
- DarkSide-50 [164]
- GERDA [165]
- LUX [166]
- Panda-X [167]
- SuperCDMS [168]
- XENON1T [169, 170]
- XENONnT [171]
- XENON1T (Solar basin) [172]
- Red giants (ω Cen) [173]
- NV Centers (projection) [174]
- Solar neutrinos [175]
- Magnons (projection) [176]
- Polaritons (projection) [177]
- DARWIN (projection) [178]
- LZ (projection) [179]
- QUAX [180, 181]
- Semiconductors (projection) [182]
- White dwarf hint [183]
- Freeze-in irreducible axions [143]
- X-rays (1-loop decay) [184]

4 Axion-nucleon

Note: CASPER and nEDM limits account for stochastic correction reported in [185]

- Casimir effect (fifth force) [186]
- CASPER-ZULF-Comagnetometer [187]
- CASPER-ZULF-Sidechain [188]
- ChangE [189]
- Hefei Spin-based amplifiers [190]
- nEDM (ultracold neutrons and mercury) [191]
- NASDUCK [192, 193]
- PSI HgM (nEDM) [194]
- K-3He comagnetometer (fifth force) [195]
- K-3He comagnetometer (dark matter) [196]
- JEDI [197]
- Old comagnetometers [198]
- Torsion balance [199]
- Neutron star cooling [200] (corrected from [201])
- SN1987A Cooling [202, 203]
- SNO (deuterium dissasociation) [204]
- Proton storage ring (projection) [205]
- Electrostatic storage ring (projection) [206]
- DM comagnetometer (projection) [198]
- CASPER-gradient (projection) [188]
- Superfluid helium-3 HPD (projection) [207]

5 Axion-EDM

- Axinovae [208]
- Beam EDM [209]
- BBN (dark matter) [210]
- CASPER-electric [211]
- nEDM [191]
- HfF^+ [212]
- JEDI [197]
- Rb/Quartz [213]
- SN1987A [214]
- *Planck*+BAO thermal axion bound [215]
- CASPER-electric (projection) [216]
- Storage Ring EDM (projection) [216]

6 Axion mass versus f_a

- BBN (dark matter) [210]
- Beam EDM [209]
- Binary pulsars and Solar core constraint on $\bar{\theta}$ [217]. I include minor numerical corrections made by [218, 219].
- GW170817 [220]
- HfF^+ [212]
- Rb/Quartz [213]
- JEDI [197]
- nEDM [191]
- Piezoaxionic effect (projection) [221]
- *Planck*+BAO thermal axion bound [215]
- SN1987A [214]
- Neutron stars (projection) [217].
- NS-NS and NS-BH Inspirals (projection) [217].
- White dwarfs [222]

6.1 Black hole superradiance

- Baryakhtar et al. [223] (just Stellar mass BHs)
- Mehta et al. [223] (Stellar mass and SMBHs)
- Stott [224]
- Ünal et al. [225] (Quasars)
- Cardoso et al. [226] (dark photon)

7 Axion theory predictions

7.1 Post-inflation QCD axion

- Ballesteros et al. [227]
- Buschmann et al. 2020 [228]
- Buschmann et al. 2021 [229]
- Bonati et al. [230]
- Borsanyi et al. [231]
- Berkowitz et al. [232]
- Dine et al. [233]
- Petreczky et al. [234]
- Fleury & Moore [235]
- Klaer & Moore [236]
- Gorghetto et al. [237]
- Saikawa et al. [70]

7.2 Other dark matter predictions

- ALP Cogenesis [238]
- Early matter domination [239]
- Post-inflation ALP misalignment [240, 241]
- Trapped misalignment (\mathcal{Z}_N axion) [218]

8 CP-violating couplings

Combined constraints [242]

Scalar-nucleon

- Red giants [243]
- MICROSCOPE [244].
- Eot-Wash [245, 246, 247]
- Irvine [248]. Corrected to 2σ limit by [249]
- HUST [250, 251, 252, 253].
- Stanford [254]
- IUPUI [255].
- Wuhan [249]

Pseudoscalar-electron

- Red giants [243]
- Eot-wash [256]
- NIST [257]
- SMILE [258].
- QUAX [259, 260, 261]
- Washington [262, 263].
- XENON1T [264]
- Magnon (projection) [177]
- QUAX (projection) [259].

Pseudoscalar-nucleon

- Neutron star cooling [200]
- Hefei (Earth) [265]
- Hefei (mm) [266]
- Washington [267]. Limit taken from [268].
- SMILE [258].
- Mainz [269]
- Moon/Sun [270]
- ARIADNE (projection) [271]
- CASPER-wind (projection) [216]
- DM comagnetometer (projection) [198]
- Fifth force Ne-Rb-K comagnetometer (projection) [272]

9 Scalars

Scalar-photon

- Globular clusters [94]
- Eot-Wash (EP) [273]
- Fifth force [274, 275, 276, 277]
- MICROSCOPE [244]
- AURIGA [278]
- BACON [279]
- Cs/Cav [280]
- DAMNED [281]
- Dy/Dy [282]
- Dy/Quartz [213]
- Dynamic Decoupling [283]
- GEO600 [284]
- LIGO O3 [285]
- Holometer [286]
- H/Quartz/Sapphire [287]
- PTB (Yb+, Sr clock) [288]
- I₂ [289]
- Rb/Cs [290]
- Sr/Si [291]
- Yb/Sr [292]
- AEDGE (projection) [293]
- AION (projection) [293]
- DUAL (projection) [294]
- MAGIS (projection) [295]
- Nuclear clock (projection) [296]
- Mechanical Resonators (projection) [297]

Scalar-electron

- Red giants [243]
- White dwarfs [298]
- Eot-Wash (EP) [273]
- Fifth force [274, 275, 276, 277]
- MICROSCOPE [244]
- AURIGA [278]
- Cs/Cav [280]
- DAMNED [281]
- GEO600 [284]
- Holometer [286]
- H/Quartz/Sapphire [287]
- I₂ [289]
- H/Si [291]
- Rb/Quartz [213]
- Yb/Cs [299]
- LIGO O3 [285]
- NANOGrav 15-year PTA [300]
- FOCOS (nuclear clock projection) [301]
- AEDGE (projection) [293]
- AION (projection) [293]
- DUAL (projection) [294]
- Optical microwave clock (projection) [302]
- Optical cavities [303]
- SrOH [304]
- Mechanical Resonators (projection) [297]
- IPTA (mock data) [305]

10 Vectors

B-L coupling

- Casimir [306, 307, 308]
- Eot-Wash (EP) [309]
- Eot-Wash (ISL) [310]
- MICROSCOPE [311]
- DM stability [312]
- Horizontal branch [243]
- Sun [243]
- Eot-Wash (DM) [313]
- LIGO (O1) [314]
- LIGO/VIRGO [314]
- LISA Pathfinder [315]
- PPTA [316]
- Asteroids (projection) [317]
- LISA (projection) [317]
- MAGIS (projection) [295]
- Optomechanical membranes (projection) [318]
- SKA (projection) [319]
- Torsion balance (projection) [319]
- STE-QUEST (projection) [320]

11 Dark photons

Combined constraints [321]

SM photon-DP transitions

- Coulomb [322, 323, 324, 325, 326],
- Plimpton & Lawton's experiment [327, 326]
- Atomic spectroscopy [328]
- Atomic force microscopy (AFM) [326]
- Static magnetic field of the Earth [329, 330, 331]
- Static magnetic field of Jupiter [332, 331].
- ALPs [61]
- ALPS-II (projection) [333]
- SPring-8 [334]
- UWA-LSW [335, 336]
- ADMX-LSW [337]
- CROWS [64].
- DarkSRF [338]
- DarkSRF (projection) [339]
- TEXONO [340]
- Crab nebula [341]
- COBE and FIRAS [342]
- STAX (projection) [343]

Production in stars

- CAST [344]
- SHIPS [345]
- HINODE [346]
- New globular cluster bound [347]
- Old stellar bounds: Solar-L, HB and RG stars [348] (see also [349])
- Neutron stars [350]
- Solar neutrinos [351]
- XENON1T [352]

Dark matter cosmology/astro

- Arias et al. [240]
- Witte et al. [353, 354]
- Caputo et al. [355, 342],
- ISM [356],
- Leo T dwarf [357]
- Gas clouds [357, 358]

Dark matter experiments

- Reinterpreted axion limits [321]
- ALPHA [42]
- AMAILS [359]
- BRASS-p [360]
- BREAD (projection) [45]
- DarkSide-50 [164]
- DAMIC [361]
- Dark E-field Radio [362]
- DM Pathfinder [363]
- DOSUE-RR [364]
- FAST Radio antenna [365]
- FUNK [366]
- LAMPOST [367]
- LOFAR (solar corona) [368]
- MuDHI [369]
- ORGAN [370]
- ORPHEUS [371]
- QUALIPHIDE [372]
- Quantum cyclotron [373]
- SENSEI [374]
- SHUKET [375]
- SuperCDMS [376]
- SuperMAG [377, 378]
- SQuAD [379],
- SQMS [380],
- SRF scanning [381]
- Tokyo dish antennae experiments [382, 383, 384]
- WISPDMS [385]
- XENON(100,1T,nT) [182, 264, 386, 387, 352, 388].

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