

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 (NGC 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- γ (ALP decay) [104, 105]
- SN1987A- γ (low mass ALP conversion) [106, 105]
- SN1987A- γ, ν (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_{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 (ω 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-wind (projection) [163]

5 Axion-EDM

- Beam EDM [178]
- BBN (dark matter) [179]
- CASPER-electric [180]
- nEDM [164]
- HfF⁺ [181]
- JEDI [170]
- Rb/Quartz [182]
- SN1987A [183]
- *Planck*+BAO thermal axion bound [184]
- CASPER-electric (projection) [185]
- Storage Ring EDM (projection) [185]

6 Axion mass versus f_a

- BBN (dark matter) [179]
- Beam EDM [178]
- Binary pulsars and Solar core constraint on $\bar{\theta}$ [186]. I include minor numerical corrections made by [187, 188].
- GW170817 [189]
- HfF⁺ [181]
- Rb/Quartz [182]
- JEDI [170]
- nEDM [164]
- Piezoaxionic effect (projection) [190]
- *Planck*+BAO thermal axion bound [184]
- SN1987A [183]
- Neutron stars (projection) [186].
- NS-NS and NS-BH Inspirals (projection) [186].
- White dwarfs [191]

6.1 Black hole superradiance

- Baryakhtar et al. [192] (just Stellar mass BHs)
- Mehta et al. [192] (Stellar mass and SMBHs)
- Stott [193]
- Ünal et al. [194] (Quasars)
- Cardoso et al. [195] (dark photon)

7 Axion theory predictions

7.1 Post-inflation QCD axion

- Ballesteros et al. [196]
- Buschmann et al. 2020 [197]
- Buschmann et al. 2021 [198]
- Bonati et al. [199]
- Borsanyi et al. [200]
- Berkowitz et al. [201]
- Dine et al. [202]
- Petreczky et al. [203]
- Fleury & Moore [204]
- Klaer & Moore [205]

7.2 Other dark matter predictions

- ALP Cogenesis [206]
- Early matter domination [207]
- Post-inflation ALP misalignment [208, 209]
- Trapped misalignment (\mathcal{Z}_N axion) [187]

8 CP-violating couplings

Combined constraints [210]

Scalar-nucleon

- Red giants [211]
- MICROSCOPE [212].
- Eot-Wash [213, 214, 215]
- Irvine [216]. Corrected to 2σ limit by [217]
- HUST [218, 219, 220, 221].
- Stanford [222]
- IUPUI [223].
- Wuhan [217]

Pseudoscalar-electron

- Red giants [211]
- Eot-wash [224]
- NIST [225]
- SMILE [226].
- QUAX [227, 228]
- Washington [229, 230].
- XENONIT [231]
- Magnon (projection) [153]
- QUAX (projection) [227].

Pseudoscalar-nucleon

- Neutron star cooling [174]
- Washington [232]. Limit taken from [233].
- SMILE [226].
- Mainz [234]
- ARIADNE (projection) [235]
- CASPER-wind (projection) [185]
- DM comagnetometer (projection) [171]

9 Scalars

Scalar-photon

- Globular clusters [85]
- Eot-Wash (EP) [236]
- Fifth force [237]
- MICROSCOPE [212]
- AURIGA [238]
- BACON [239]
- Cs/Cav [240]
- DAMNED [241]
- Dy/Dy [242]
- Dy/Quartz [182]
- Dynamic Decoupling [243]
- GEO600 [244]
- Holometer [245]
- H/Quartz/Sapphire [246]
- PTB (Yb+, Sr clock) [247]
- I₂ [248]
- Rb/Cs [249]
- Sr/Si [250]
- AEDGE (projection) [251]
- AION (projection) [251]
- DUAL (projection) [237]
- MAGIS (projection) [252]
- Nuclear clock (projection) [253]
- Mechanical Resonators (projection) [254]

Scalar-electron

- Red giants [211]
- Eot-Wash (EP) [236]
- Fifth force [237]
- MICROSCOPE [212]
- AURIGA [238]
- Cs/Cav [240]
- DAMNED [241]
- GEO600 [244]
- Holometer [245]
- H/Quartz/Sapphire [246]
- I₂ [248]
- H/Si [250]
- Rb/Quartz [182]
- AEDGE (projection) [251]
- AION (projection) [251]
- DUAL (projection) [237]
- Optical microwave clock (projection) [237]
- Optical cavities [255]
- SrOH [256]
- Mechanical Resonators (projection) [254]
- IPTA (mock data) [257]

10 Vectors

B-L coupling

- Casimir [258, 259, 260]
- Eot-Wash (EP) [236]
- Eot-Wash (ISL) [261]
- MICROSCOPE [262]
- DM stability [263]
- Horizontal branch [211]
- Sun [211]
- Eot-Wash (DM) [264]
- LIGO (O1) [265]
- LIGO/VIRGO [265]
- Asteroids (projection) [266]
- LISA (projection) [266]
- MAGIS (projection) [252]
- Optomechanical membranes (projection) [267]
- SKA (projection) [268]
- Torsion balance (projection) [268]

11 Dark photons

Combined constraints [269]

SM photon-DP transitions

- Coulomb [270, 271, 272, 273, 274],
- Plimpton & Lawton's experiment [275, 274]
- Atomic spectroscopy [276]
- Atomic force microscopy (AFM) [274]
- Static magnetic field of the Earth [277, 278, 279]
- Static magnetic field of Jupiter [280, 279].
- ALPs [54]
- SPring-8 [281]
- UWA-LSW [282, 283]
- ADMX-LSW [284]
- CROWS [57].
- TEXONO [285]
- Crab nebula [286]
- COBE and FIRAS [287]

Production in stars

- CAST [288]
- SHIP [289]
- HINODE [290]
- HB and RG stars [291]
- Neutron stars [292]
- Solar neutrinos [293]
- XENON1T [294]

Dark matter cosmology/astro

- Arias et al. [208]
- Witte et al. [295, 296]
- Caputo et al. [297, 287],
- IGM [298],
- Leo T dwarf [299]
- Gas clouds [300]

Dark matter experiments

- Reinterpreted axion limits [269]
- BREAD (projection) [40]
- DAMIC [301]
- Dark E-field Radio [302]
- DM Pathfinder [303]
- DOSUE-RR [304]
- FAST Radio antenna [305]
- FUNK [306]
- LAMPOST [307]
- LOFAR (solar corona) [308]
- MuDHI [309]
- ORGAN [310]
- ORPHEUS [311]
- QUALIPHIDE [312]
- Quantum cyclotron [313]
- SENSEI [314]
- SHUKET [315]
- SuperCDMS [316]
- SuperMAG [317, 318]
- SQuAD [319],
- SQMS [320],
- Tokyo dish antennae experiments [321, 322, 323]
- WISPDMS [324]
- XENON(100,1T,nT) [158, 231, 325, 326, 294, 327].

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