References for AxionLimits webpage

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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, 18]
- CAST-CAPP [19]
- DANCE [20]
- BASE [21]
- GrAHal [22]
- HAYSTAC [23, 24, 25]
- LIDA [26]
- ORGAN [27, 28, 29]
- QUAX [30, 31, 32, 33]
- RADES [34]
- RBF [35]
- SHAFT [36]
- TASEH [37]
- SuperMAG [38]
- UF [39]
- UPLOAD-DOWNLOAD [40, 41]
- ABRACADABRA (projection) [42]
- ADBC (projection) [43]
- ADMX (projection) [44]
- aLIGO (projection) [45]
- ALPHA (projection) [46, 47]
- BabyIAXO-RADES (projection) [48]
- BRASS (projection) [49]
- BREAD (projection) [50]
- CADEx (projection) [51]
- DALI (projection) [52]
- DarkGEO (projection) [53]
- DM-Radio (projection) [54, 55]
- DANCE (projection) [56]
- LAMPOST (projection) [57]
- MADMAX (projection) [58]
- FLASH (projection) [59, 60]
- QUAX (projection) [61]
- ORGAN (projection) [27]
- TOORAD (projection) [62]
- Twisted Anyon Cavity (projection) [63]
- WISPLC (projection) [64]
- SRF heterodyne cavity (projection) [65]

LSW/Helioscopes

- ALPS [66]
- CAST [67, 68]
- CROWS [69]
- OSQAR [70]
- PVLAS [71]
- SAPPHIRES [72, 73]
- ALPS-II (projection) [74]
- IAXO (projection) [75]
- IAXO (Galactic SN) [76]
- WISPFI (projection) [77]

Astro

- 21 cm power spectrum (projection) [78]
- Axion star explosions [79]
- Betelgeuse [80]
- BICEP/KECK [81]
- Black hole polarimetry [82]
- Breakthrough Listen (Doppler shifted radio line in MW) [83]
- Bullet Cluster (archival radio data) [84]
- Cosmic IR background (hint) [85]
- Chandra (Hydra) [86]
- Chandra (M87) [87]
- Chandra (NG7 1275) [88]
- Chandra (H1821+643) [89]
- CMB Anisotropies [90, 91]
- COBE/FIRAS+Planck spectral dist. [92]
- Diffuse gamma-rays [93]
- Diffuse SN ALPs [94] (see also [95])
- Distance ladder [96]
- Fermi-LAT (NGC 1275) [97]
- Fermi-LAT (Extragalactic SNe) [98]
- Fermi-LAT (Quasars) [99]
- Gamma-ray attenuation (ALP dark matter) [100]
- Globular clusters (R parameter) [101]
- Globular clusters (R_2 parameter) [102]
- GW170817 (Fermi) [103]
- GW170817 [104]
- HAWC (TeV Blazars) [105]
- HESS (PKS 2155-304) [106]
- INTEGRAL (ALP decay) [107]
- Leo T gas temperature [108]
- MAGIC (Perseus galaxy cluster) [109]
- Magnetic white dwarfs (X-rays) [110]
- Magnetic white dwarf (polarization) [111]
- MOJAVE [112]
- Mrk 421 (ARGO-YBJ+Fermi): [113]
- Mrk 421 (ARGO-YBJ+MAGIC): [114]
- Neutron Stars (Foster et al. 2020) [115]
- Neutron Stars (Darling 2020) [116]
- Neutron Stars (Battye et al. 2021) [117]
- Neutron stars (Foster et al. 2022) [118]
- Neutron Stars (Battye et al. 2023) [119]
- NuSTAR (decaying dark matter, recast from Sterile nu) [120, 121, 122]
- Planck cosmic birefringence [123]
- POLARBEAR [124, 125]
- PPTA+QUIJOTE [126]
- Pulsar polarisation arrays (projection) [127]
- Pulsar polar cap [128]
- PSR J0437-4715 polarisation [129]
- Red supergiant [130]
- Solar neutrinos [131]
- Stellar axion background [132]
- SN1987A-γ (ALP decay) [133, 134, 135]
- SN1987A-γ (low mass ALP conversion) [136, 134]
- SN1987A-γ,ν (high mass ALPs) [137, 138, 93]
- SN1987A (PVO) [139]
- Sgr A* [140]
- Low-energy supernovae (ALP decay) [93]
- Solar basin (NuSTAR) [141]
- Solar basin (NuSTAR and SPHINX) [142]
- Super Star clusters [143]
- SPT [144]
- Telescopes (Haystack) [145]
- Telescopes (MUSE) [146] (updated from: [147])
- Telescopes (VIMOS) [148]
- Telescopes (HST) [149, 150]
- Telescopes (JWST) [151]
- Telescopes (WINERED) [152, 153]

- Telescopes (eROSITA) [154]
- Fermi galactic SN (projection) [155]
- THESEUS (projection) [156]
- eROSITA (projection) [157]
- XRISM (projection) [158]
- White dwarf initial-final mass relation [159]
- XMM-Newton (decaying DM ALPs) [160]

Cosmology

- Ionisation fraction, EBL, X-rays [161]
- BBN+$N_{\rm eff}$ [162]
- Freeze in [163]

2 Heavy ALP-photon coupling

- ATALS (PbPb) [164]
- BaBar [165]
- Beam dump [166, 167, 165, 168, 169]
- Belle II [170]
- BESIII [171]
- CMS (PbPb) [172]
- LEP [173]
- LHC (pp)[174]
- MiniBooNE [175]
- NOMAD [176]
- OPAL [174]
- PrimEx [177, 178]
- CONUS (projection) [179]
- DUNE (projection) [180]
- FASER LLP (projection) [181]

3 Axion-electron

- Electron g-2 [182]
- EDELWEISS [183]
- Fermionic axion interferometer [184]
- Magnon non-demolition [185]
- DarkSide-50 [186]
- GERDA [187]
- LUX [188]
- Old comagnetometers [189]
- Panda-X [190]
- Torsion pendulum (spin force) [191]
- Torsion pendulum (axion wind) [192]
- SuperCDMS [193]
- XENON1T [194, 195]
- XENONnT [196]
- XENON1T (Solar basin) [197]
- Red giants (ωCen) [198]
- Solar neutrinos [199]
- Electron storage ring (projection) [200]
- Axion wind multilayer (projection) [201]
- Magnons (projection) [202]
- Polaritons (projection) [203]
- DARWIN (projection) [204]
- LZ (projection) [205]
- QUAX [206, 207]
- NV Centers (projection) [208]
- Superconductors (projection) [209]
- Semiconductors (projection) [210]
- Spin-orbit coupling (projection) [211]
- Torsion pendulum (projection) [212]
- YIG (projection) [202]
- White dwarf hint [213]
- Freeze-in irreducible axions [163]
- X-rays (1-loop decay) [214]

4 Axion-nucleon

Note: CASPEr and nEDM limits account for stochastic correction reported in [215]

- Casimir effect (fifth force) [216]
- CASPEr-ZULF-Comagnetometer [217]
- CASPEr-ZULF-Sidechain [218]
- ChangE [219, 220]
- Hefei Spin-based amplifiers [221]
- nEDM (ultracold neutrons and mercury) [222]
- NASDUCK [223, 224]
- PSI HgM (nEDM) [225]
- K-3He comagnetometer (fifth force) [226]
- K-3He comagnetometer (dark matter) [227]
- JEDI [228]
- Old comagnetometers [189]
- Torsion balance [229]
- Neutron star cooling [230] (corrected from [231])
- SN1987A Cooling [232, 233]
- SNO (deuterium dissasociation) [234]
- Proton storage ring (projection) [235]
- Electrostatic storage ring (projection) [200]
- DM comagnetometer (projection) [189]
- CASPEr-gradient (projection) [218]
- Superfluid helium-3 HPD (projection) [236]
- MnCO3 (projection) [237]

5 Axion-EDM

- Axinovae [238]
- Beam EDM [239]
- BBN (dark matter) [240]
- CASPEr-electric [241]
- nEDM [222]
- HfF^+ [242]
- JEDI [228]
- Rb/Quartz [243]
- SN1987A [244]
- *Planck*+BAO thermal axion bound [245]
- CASPEr-electric (projection) [246]
- Storage Ring EDM (projection) [246]
- Polarisation haloscope (projection) [247]

6 Axion-top

Axion-top coupling limits originally compiles in Ref. [248]

7 Axion mass versus f_a

- BBN (dark matter) [240]
- Beam EDM [239]
- Binary pulsars and Solar core constraint on $\bar{\theta}$ [249]. I include minor numerical corrections made by [250, 251].
- GW170817 [252]
- HfF^+ [242]
- Rb/Quartz [243]
- JEDI [228]
- nEDM [222]
- Tritium decay [253]
- Piezoaxionic effect (projection) [254]
- *Planck*+BAO thermal axion bound [245]
- SN1987A [244]
- Neutron stars (projection) [249].
- NS-NS and NS-BH Inspirals (projection) [249].
- White dwarfs [255]
- Polarisation haloscope (projection) [247]

7.1 Black hole superradiance

- Baryakhtar et al. [256] (just Stellar mass BHs)
- Mehta et al. [256] (Stellar mass and SMBHs)
- Stott [257]
- Ünal et al. [258] (Quasars)
- Cardoso et al. [259] (dark photon)

8 Axion theory predictions

8.1 Post-inflation QCD axion

- Ballesteros et al. [260]
- Buschmann et al. 2020 [261]
- Buschmann et al. 2021 [262]
- Bonati et al. [263]
- Borsanyi et al. [264]
- Berkowitz et al. [265]
- Dine et al. [266]
- Petreczky et al. [267]
- Fleury & Moore [268]
- Klaer & Moore [269]
- Gorghetto et al. [270]
- Saikawa et al. (2019) [75]
- Saikawa et al. (2024) [271]

8.2 Other dark matter predictions

- ALP Cogenesis [272]
- Early matter domination [273]
- Post-inflation ALP misalignment [274, 275]
- Trapped misalignment ($\mathcal{Z}_\mathcal{N}$ axion) [250]

9 CP-violating couplings

Combined constraints [276]

Scalar-nucleon

- Red giants [277]
- MICROSCOPE [278].
- Eot-Wash [279, 280, 281]
- Irvine [282]. Corrected to 2σ limit by [283]
- HUST [284, 285, 286, 287].
- Stanford [288]
- IUPUI [289].
- Wuhan [283]

Pseudoscalar-electron

- Red giants [277]
- Eot-wash [290]
- e^+e^- Penning trap [291]
- NIST [292]
- SMILE [293]
- Perihelion shift [294]
- QUAX [295, 296, 297]
- Washington [191, 298].
- XENON1T [299]
- ACME (projection) [300]
- Magnon (projection) [203]
- QUAX (projection) [295].

Pseudoscalar-nucleon

- Neutron star cooling [230]
- Hefei (Earth) [301]
- Hefei (mm) [302]
- Washington [303]. Limit taken from [304].
- SMILE [293].
- Mainz [305]
- Moon/Sun [306]
- Yb trap (projection) [300]
- ARIADNE (projection) [307]
- CASPEr-wind (projection) [246]
- DM comagnetometer (projection) [189]
- Fifth force Ne-Rb-K comagnetometer (projection) [308]

10 Scalars

Scalar-photon

- Globular clusters [102]
- Eot-Wash (EP) [309]
- Fifth force [310, 311, 312, 313]
- MICROSCOPE [278]
- AURIGA [314]
- BACON [315]
- Cs/Cav [316]
- DAMNED [317]
- Dy/Dy [318]
- Dy/Quartz [243]
- Dynamic Decoupling [319]
- GEO600 [320]
- LIGO O3 [321]
- Holometer [322]
- H/Quartz/Sapphire [323]
- PTB (Yb+, Sr clock) [324]
- I_2 [325]
- Rb/Cs [326]
- Sr/Si [327]
- Yb/Sr [328]
- AEDGE (projection) [329]
- AION (projection) [329]
- DUAL (projection) [330]
- MAGIS (projection) [331]
- Nuclear clock (projection) [332]
- Mechanical Resonators (projection) [333]

Scalar-electron

- Red giants [277]
- White dwarfs [334]
- Eot-Wash (EP) [309]
- Fifth force [310, 311, 312, 313]
- MICROSCOPE [278]
- AURIGA [314]
- Cavities [335]
- Cs/Cav [316]
- DAMNED [317]
- GEO600 [320]
- Holometer [322]
- H/Quartz/Sapphire [323]
- I_2 [325]
- H/Si [327]
- Rb/Quartz [243]
- Yb/Cs [336]
- LIGO O3 [321]
- NANOGrav 15-year PTA [337]
- FOCOS (nuclear clock projection) [338]
- AEDGE (projection) [329]
- AION (projection) [329]
- DUAL (projection) [330]
- HELIOS (projection) [339]
- Optical microwave clock (projection) [340]
- Optical cavities [341]
- SrOH [342]
- Mechanical Resonators (projection) [333]
- IPTA (mock data) [343]

11 Vectors

B-L coupling

- Casimir [344, 345, 346]
- Eot-Wash (EP) [347]
- Eot-Wash (ISL) [348]
- MICROSCOPE [349]
- DM stability [350]
- Horizontal branch [351]
- Red giant [351]
- Sun [351]
- Eot-Wash (DM) [352]
- LIGO (O1) [353]
- LIGO/VIRGO [353]
- LISA Pathfinder [354, 355]
- PPTA [356]
- Asteroids (projection) [357]
- HELIOS (projection) [339]
- LISA (projection) [357]
- MAGIS (projection) [331]
- Optomechanical membranes (projection) [358]
- SKA (projection) [359]
- Torsion balance (projection) [359]
- STE-QUEST (projection) [360]

12 Dark photons

Combined constraints [361]

SM photon-DP transitions

- Coulomb [362, 363, 364, 365, 366],
- Plimpton & Lawton's experiment [367, 366]
- Atomic spectroscopy [368]
- Atomic force microscopy (AFM) [366]
- Static magnetic field of the Earth [369, 370, 371]
- Static magnetic field of Jupiter [372, 371].
- Jupiter B-field/Juno mission [373]
- ALPs [66]
- ALPS-II (projection) [374]
- SPring-8 [375]
- UWA-LSW [376, 377]
- ADMX-LSW [378]
- CROWS [69].
- DarkSRF [379]
- DarkSRF (projection) [380]
- TEXONO [381]
- Crab nebula [382]
- COBE and FIRAS [383]
- STAX (projection) [384]

Production in stars

- CAST [385]
- SHIPS [386]
- HINODE [387]
- IAXO (modified for longitudinal mode) [388]
- New globular cluster bound [389]
- Old stellar bounds: Solar-L, HB and RG stars [351] (see also [390])
- Neutron stars [391]
- Solar neutrinos [392]
- XENON1T [393]

Dark matter cosmology/astro

- Arias et al. [274]
- Witte et al. [394, 395]
- Caputo et al. [396, 383],
- ISM [397],
- Leo T dwarf [398]
- Gas clouds [398, 399]

Dark matter experiments

- Reinterpreted axion limits [361]
- ALPHA [47]
- AMAILS [400]
- BRASS-p [401]
- BREAD (projection) [50]
- Dandelion (projection) [402]
- DarkSide-50 [186]
- DAMIC [403]
- Dark E-field Radio [404]
- DM Pathfinder [405]
- DOSUE-RR [406, 407]
- FAST Radio antenna [408]
- FUNK [409]
- GigaBREAD [410]
- LAMPOST [411]
- LOFAR (solar corona) [412]
- MuDHI [413]
- ORGAN [414]
- ORPHEUS [415]
- QUALIPHIDE [416]
- Quantum cyclotron [417]
- SENSEI [418]
- SHUKET [419]
- SuperCDMS [420]
- SuperMAG [421, 422]
- SQuAD [423],
- SQMS [424],
- SUPAX [425]
- SRF scanning [426]
- Tokyo dish antennae experiments [427, 428, 429]
- WISPDMX [430]
- XENON(100,1T,nT) [431, 299, 432, 433, 393, 434].

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