References for AxionLimits webpage

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1 Axion-photon

Haloscopes

- ABRACADABRA [1, 2]
- ADBC [3]
- ADMX [4, 5, 6, 7]
- ADMX-Sidecar [8, 9]
- ADMX-SLIC [10]
- CAPP [11, 12, 13, 14, 15, 16, 17, 18, 19, 20]
- CAST-CAPP [21]
- DANCE [22]
- BASE [23]
- GrAHal [24]
- HAYSTAC [25, 26, 27]
- LIDA [28]
- ORGAN [29, 30, 31]
- QUAX [32, 33, 34, 35]
- RADES [36, 37]
- RBF [38]
- SHAFT [39]
- TASEH [40]
- SuperMAG [41]
- UF [42]
- UPLOAD-DOWNLOAD [43, 44]
- ABRACADABRA (projection) [45]
- ADBC (projection) [46]
- ADMX (projection) [47]
- aLIGO (projection) [48]
- ALPHA (projection) [49, 50]
- BabyIAXO-RADES (projection) [51]
- BRASS (projection) [52]
- BREAD (projection) [53]
- CADEx (projection) [54]
- DALI (projection) [55]
- DarkGEO (projection) [56]
- DM-Radio (projection) [57, 58]
- DANCE (projection) [59]
- LAMPOST (projection) [60]
- MADMAX (projection) [61]
- FLASH (projection) [62, 63]
- QUAX (projection) [64]
- ORGAN (projection) [29]
- TOORAD (projection) [65]
- Twisted Anyon Cavity (projection) [66]
- WISPLC (projection) [67]
- SRF heterodyne cavity (projection) [68]

LSW/Helioscopes

- ALPS [69]
- CAST [70, 71]
- CROWS [72]
- OSQAR [73]
- PVLAS [74]
- SAPPHIRES [75, 76]
- ALPS-II (projection) [77]
- IAXO (projection) [78]
- IAXO (Galactic SN) [79]
- WISPFI (projection) [80]

Astro

- 21 cm power spectrum (projection) [81]
- ATHENA (projection) [82]
- Axion star explosions [83]
- Betelgeuse [84]
- BICEP/KECK [85]
- Black hole polarimetry [86]
- Breakthrough Listen (Doppler shifted radio line in MW) [87]
- Bullet Cluster (archival radio data) [88]
- Cosmic IR background (hint) [89]
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- Chandra (M87) [91]
- Chandra (NG7 1275) [92]
- Chandra (H1821+643) [93]
- CMB Anisotropies [94, 95]
- COBE/FIRAS+Planck spectral dist. [96]
- Diffuse gamma-rays [97]
- Diffuse SN ALPs [98] (see also [99])
- Distance ladder [100]
- Fermi-LAT (NGC 1275) [101]
- Fermi-LAT (Extragalactic SNe) [102]
- Fermi-LAT (Quasars) [103]
- FIRAS [104]
- Gamma-ray attenuation (ALP dark matter) [105]
- Globular clusters (R parameter) [106]
- Globular clusters (R_2 parameter) [107]
- GW170817 (Fermi) [108]
- GW170817 [109]
- HAWC (TeV Blazars) [110]
- HESS (PKS 2155-304) [111]
- INTEGRAL (ALP decay) [112]
- Leo T gas temperature [113]
- M82 (NuSTAR) [114]
- MAGIC (Perseus galaxy cluster) [115]
- Magnetic white dwarfs (X-rays) [116]
- Magnetic white dwarf (polarization) [117]
- MOJAVE [118]
- Mrk 421 (ARGO-YBJ+Fermi): [119]
- Mrk 421 (ARGO-YBJ+MAGIC): [120]
- Neutron Stars (Foster et al. 2020) [121]
- Neutron Stars (Darling 2020) [122]
- Neutron Stars (Battye et al. 2021) [123]
- Neutron stars (Foster et al. 2022) [124]
- Neutron Stars (Battye et al. 2023) [125]
- NuSTAR (decaying dark matter, recast from Sterile nu) [126, 127, 128]
- Planck cosmic birefringence [129]
- POLARBEAR [130, 131]
- PPTA+QUIJOTE [132]
- Pulsar polarisation arrays (projection) [133]
- Pulsar polar cap [134]
- PSR J0437-4715 polarisation [135]
- Red supergiant [136]
- Solar neutrinos [137]
- Stellar axion background [138]
- SN1987A-γ (ALP decay) [139, 140, 141]
- SN1987A-γ (low mass ALP conversion) [142, 140]
- SN1987A-γ,ν (high mass ALPs) [143, 144, 97]
- SN1987A (PVO) [145]
- Sgr A* [146]
- Low-energy supernovae (ALP decay) [97]
- Solar basin (NuSTAR) [147]
- Solar basin (NuSTAR and SPHINX) [148]
- Super Star clusters [149]
- SPT [150]
- Telescopes (Haystack) [151]
- Telescopes (MUSE) [152] (updated from: [153])
- Telescopes (VIMOS) [154]
- Telescopes (HST) [155, 156]
- Telescopes (JWST) [157]
- Telescopes (WINERED) [158, 159]

- Telescopes (eROSITA) [160]
- Fermi galactic SN (projection) [161]
- THESEUS (projection) [162]
- eROSITA (projection) [163]
- XRISM (projection) [164]
- White dwarf initial-final mass relation [165]
- XMM-Newton (decaying DM ALPs) [166]

Cosmology

- Ionisation fraction, EBL, X-rays [167]
- BBN+$N_{\rm eff}$ [168]
- Freeze in [169]

2 Heavy ALP-photon coupling

- ATALS (PbPb) [170]
- BaBar [171]
- Beam dump [172, 173, 171, 174, 175]
- Belle II [176]
- BESIII [177]
- CMS (PbPb) [178]
- EuXFL [179]
- LEP [180]
- LHC (pp)[181]
- MiniBooNE [182]
- NOMAD [183]
- OPAL [181]
- PrimEx [184, 185]
- CONUS (projection) [186]
- DUNE (projection) [187]
- FASER LLP (projection) [188]

3 Axion-electron

- Electron g-2 [189]
- EDELWEISS [190]
- Fermionic axion interferometer [191]
- Magnon non-demolition [192]
- DarkSide-50 [193]
- GERDA [194]
- LUX [195]
- Old comagnetometers [196]
- Panda-X [197]
- Torsion pendulum (spin force) [198]
- Torsion pendulum (axion wind) [199]
- SuperCDMS [200]
- XENON1T [201, 202]
- XENONnT [203]
- XENON1T (Solar basin) [204]
- Red giants (ωCen) [205]
- Solar neutrinos [206]
- Electron storage ring (projection) [207]
- Axion wind multilayer (projection) [208]
- Magnons (projection) [209]
- Polaritons (projection) [210]
- DARWIN (projection) [211]
- LZ (projection) [212]
- QUAX [213, 214]
- NV Centers (projection) [215]
- Superconductors (projection) [216]
- Semiconductors (projection) [217]
- Spin-orbit coupling (projection) [218]
- Torsion pendulum (projection) [219]
- YIG (projection) [209]
- White dwarf hint [220]
- Freeze-in irreducible axions [169]
- X-rays (1-loop decay) [221]

4 Axion-nucleon

Note: CASPEr and nEDM limits account for stochastic correction reported in [222]

- Casimir effect (fifth force) [223]
- CASPEr-ZULF-Comagnetometer [224]
- CASPEr-ZULF-Sidechain [225]
- ChangE [226, 227]
- Hefei Spin-based amplifiers [228]
- nEDM (ultracold neutrons and mercury) [229]
- NASDUCK [230, 231]
- PSI HgM (nEDM) [232]
- K-3He comagnetometer (fifth force) [233]
- K-3He comagnetometer (dark matter) [234]
- JEDI [235]
- Old comagnetometers [196]
- Torsion balance [236]
- Neutron star cooling [237] (corrected from [238])
- SN1987A Cooling [239, 240]
- SNO (deuterium dissasociation) [241]
- Proton storage ring (projection) [242]
- Electrostatic storage ring (projection) [207]
- DM comagnetometer (projection) [196]
- CASPEr-gradient (projection) [225]
- Superfluid helium-3 HPD (projection) [243]
- MnCO3 (projection) [244]

5 Axion-EDM

- Axinovae [245]
- Beam EDM [246]
- BBN (dark matter) [247]
- CASPEr-electric [248]
- nEDM [229]
- HfF^+ [249]
- I_2^+/Ca^+ [250]
- JEDI [235]
- Rb/Quartz [251]
- SN1987A [252]
- *Planck*+BAO thermal axion bound [253]
- CASPEr-electric (projection) [254]
- Storage Ring EDM (projection) [254]
- Polarisation haloscope (projection) [255]

6 Axion-top

Axion-top coupling limits originally compiles in Ref. [256]

7 Axion mass versus f_a

- BBN (dark matter) [247]
- Beam EDM [246]
- Binary pulsars and Solar core constraint on $\bar{\theta}$ [257]. I include minor numerical corrections made by [258, 259].
- GW170817 [260]
- HfF^+ [249]
- Rb/Quartz [251]
- JEDI [235]
- nEDM [229]
- Tritium decay [261]
- Piezoaxionic effect (projection) [262]
- *Planck*+BAO thermal axion bound [253]
- SN1987A [252]
- Neutron stars (projection) [257].
- NS-NS and NS-BH Inspirals (projection) [257].
- White dwarfs [263]
- Polarisation haloscope (projection) [255]

7.1 Black hole superradiance

- Baryakhtar et al. [264] (just Stellar mass BHs)
- Mehta et al. [264] (Stellar mass and SMBHs)
- Stott [265]
- Ünal et al. [266] (Quasars)
- Cardoso et al. [267] (dark photon)

8 Axion theory predictions

8.1 Post-inflation QCD axion

- Ballesteros et al. [268]
- Buschmann et al. 2020 [269]
- Buschmann et al. 2021 [270]
- Bonati et al. [271]
- Borsanyi et al. [272]
- Berkowitz et al. [273]
- Dine et al. [274]
- Petreczky et al. [275]
- Fleury & Moore [276]
- Klaer & Moore [277]
- Gorghetto et al. [278]
- Saikawa et al. (2019) [78]
- Saikawa et al. (2024) [279]

8.2 Other dark matter predictions

- ALP Cogenesis [280]
- Early matter domination [281]
- Post-inflation ALP misalignment [282, 283]
- Trapped misalignment ($\mathcal{Z}_\mathcal{N}$ axion) [258]

9 CP-violating couplings

Combined constraints [284]

Scalar-nucleon

- Red giants [285]
- MICROSCOPE [286].
- Eot-Wash [287, 288, 289]
- Irvine [290]. Corrected to 2σ limit by [291]
- HUST [292, 293, 294, 295].
- Stanford [296]
- IUPUI [297].
- Wuhan [291]

Pseudoscalar-electron

- Red giants [285]
- Eot-wash [298]
- e^+e^- Penning trap [299]
- NIST [300]
- SMILE [301]
- Perihelion shift [302]
- QUAX [303, 304, 305]
- Washington [198, 306].
- XENON1T [307]
- ACME (projection) [308]
- Magnon (projection) [210]
- QUAX (projection) [303].

Pseudoscalar-nucleon

- Neutron star cooling [237]
- Hefei (Earth) [309]
- Hefei (mm) [310]
- Washington [311]. Limit taken from [312].
- SMILE [301].
- Mainz [313]
- Moon/Sun [314]
- Yb trap (projection) [308]
- ARIADNE (projection) [315]
- CASPEr-wind (projection) [254]
- DM comagnetometer (projection) [196]
- Fifth force Ne-Rb-K comagnetometer (projection) [316]

10 Scalars

Scalar-photon

- Globular clusters [107]
- Eot-Wash (EP) [317]
- Fifth force [318, 319, 320, 321]
- MICROSCOPE [286]
- AURIGA [322]
- BACON [323]
- Cs/Cav [324]
- DAMNED [325]
- Dy/Dy [326]
- Dy/Quartz [251]
- Dynamic Decoupling [327]
- GEO600 [328]
- LIGO O3 [329], see also [330]
- Holometer [331]
- H/Quartz/Sapphire [332]
- PTB (Yb+, Sr clock) [333]
- I_2 [334]
- Rb/Cs [335]
- Sr/Si [336]
- Yb/Sr [337]
- AEDGE (projection) [338]
- AION (projection) [338]
- DUAL (projection) [339]
- MAGIS (projection) [340]
- Nuclear clock (projection) [341]
- Mechanical Resonators (projection) [342]

Scalar-electron

- Red giants [285]
- White dwarfs [343]
- Eot-Wash (EP) [317]
- Fifth force [318, 319, 320, 321]
- MICROSCOPE [286]
- AURIGA [322]
- Cavities [344]
- Cs/Cav [324]
- DAMNED [325]
- GEO600 [328]
- Holometer [331]
- H/Quartz/Sapphire [332]
- LIGO O3 [329], see also [330]
- I_2 [334]
- H/Si [336]
- Rb/Quartz [251]
- Yb/Cs [345]
- LIGO O3 [330]
- NANOGrav 15-year PTA [346]
- FOCOS (nuclear clock projection) [347]
- AEDGE (projection) [338]
- AION (projection) [338]
- DUAL (projection) [339]
- HELIOS (projection) [348]
- Optical microwave clock (projection) [349]
- Optical cavities [350]
- SrOH [351]
- Mechanical Resonators (projection) [342]
- IPTA (mock data) [352]

11 Vectors

B-L coupling

- Casimir [353, 354, 355]
- Eot-Wash (EP) [356]
- Eot-Wash (ISL) [357]
- MICROSCOPE [358]
- DM stability [359]
- Horizontal branch [360]
- Red giant [360]
- Sun [360]
- Eot-Wash (DM) [361]
- LIGO (O1) [362]
- LIGO/VIRGO [362]
- LISA Pathfinder [363, 364]
- PPTA [365]
- Asteroids (projection) [366]
- HELIOS (projection) [348]
- LISA (projection) [366]
- MAGIS (projection) [340]
- Optomechanical membranes (projection) [367]
- SKA (projection) [368]
- Torsion balance (projection) [368]
- STE-QUEST (projection) [369]

12 Dark photons

Combined constraints [370]

SM photon-DP transitions

- Coulomb [371, 372, 373, 374, 375],
- Plimpton & Lawton's experiment [376, 375]
- Atomic spectroscopy [377]
- Atomic force microscopy (AFM) [375]
- Static magnetic field of the Earth [378, 379, 380]
- Static magnetic field of Jupiter [381, 380].
- Jupiter B-field/Juno mission [382]
- ALPs [69]
- ALPS-II (projection) [383]
- SPring-8 [384]
- UWA-LSW [385, 386]
- ADMX-LSW [387]
- CROWS [72].
- DarkSRF [388]
- DarkSRF (projection) [389]
- TEXONO [390]
- Crab nebula [391]
- COBE and FIRAS [392]
- STAX (projection) [393]

Production in stars

- CAST [394]
- SHIPS [395]
- HINODE [396]
- IAXO (modified for longitudinal mode) [397]
- New globular cluster bound [398]
- Old stellar bounds: Solar-L, HB and RG stars [360] (see also [399])
- Neutron stars [400]
- Solar neutrinos [401]
- XENON1T [402]

Dark matter cosmology/astro

- Arias et al. [282]
- Witte et al. [403, 404]
- Caputo et al. [405, 392],
- ISM [406],
- Leo T dwarf [407]
- Gas clouds [407, 408]
- JWST [409]

Dark matter experiments

- Reinterpreted axion limits [370]
- APEX [410]
- ALPHA [50]
- AMAILS [411]
- BRASS-p [412]
- BREAD (projection) [53]
- Dandelion (projection) [413]
- DarkSide-50 [193]
- DAMIC [414]
- Dark E-field Radio [415]
- DM Pathfinder [416]
- DOSUE-RR [417, 418]
- FAST Radio antenna [419]
- FUNK [420]
- GigaBREAD [421]
- LAMPOST [422]
- LOFAR (solar corona) [423]
- MuDHI [424]
- ORGAN [425]
- ORPHEUS [426]
- QUALIPHIDE [427]
- Quantum cyclotron [428]
- SENSEI [429]
- SHUKET [430]
- SuperCDMS [431]
- SuperMAG [432, 433]
- SQuAD [434],
- SQMS [435],
- SUPAX [436]
- SRF scanning [437]
- Tokyo dish antennae experiments [438, 439, 440]
- WISPDMX [441]
- XENON(100,1T,nT) [442, 307, 443, 444, 402, 445].

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