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

LSW/Helioscopes

- ALPS [62]
- CAST [63, 64]
- CROWS [65]
- OSQAR [66]
- PVLAS [67]
- SAPPHIRES [68, 69]
- ALPS-II (projection) [70]
- IAXO (projection) [71]
- IAXO (Galactic SN) [72]
- WISPFI (projection) [73]

Astro

- Axion star explosions [74]
- Betelgeuse [75]
- BICEP/KECK [76]
- Breakthrough Listen (Doppler shifted radio line in MW) [77]
- Bullet Cluster (archival radio data) [78]
- Cosmic IR background (hint) [79]
- Chandra (Hydra) [80]
- Chandra (M87) [81]
- Chandra (NG7 1275) [82]
- Chandra (H1821+643) [83]
- CMB Anisotropies [84, 85]
- COBE/FIRAS+Planck spectral dist. [86]
- Diffuse gamma-rays [87]
- Diffuse SN ALPs [88] (see also [89])
- Distance ladder [90]
- Fermi-LAT (NGC 1275) [91]
- Fermi-LAT (Extragalactic SNe) [92]
- Fermi-LAT (Quasars) [93]
- Gamma-ray attenuation (ALP dark matter) [94]
- Globular clusters (R parameter) [95]
- Globular clusters (R_2 parameter) [96]
- HAWC (TeV Blazars) [97]
- HESS (PKS 2155-304) [98]
- INTEGRAL (ALP decay) [99]
- Leo T gas temperature [100]
- Magnetic white dwarfs (X-rays) [101]
- Magnetic white dwarf (polarization) [102]
- MOJAVE [103]
- Mrk 421 (ARGO-YBJ+Fermi): [104]
- Mrk 421 (ARGO-YBJ+MAGIC): [105]
- Neutron Stars (Foster et al. 2020) [106]
- Neutron Stars (Darling 2020) [107]
- Neutron Stars (Battye et al. 2021) [108]
- Neutron stars (Foster et al. 2022) [109]
- Neutron Stars (Battye et al. 2023) [110]
- NuSTAR (decaying dark matter, recast from Sterile nu) [111, 112, 113]
- Planck cosmic birefringence [114]
- POLARBEAR [115]
- PPTA+QUIJOTE [116]
- Pulsar polarisation arrays (projection) [117]
- Pulsar polar cap [118]
- Red supergiant [119]
- Solar neutrinos [120]
- Stellar axion background [121]
- SN1987A-γ (ALP decay) [122, 123, 124]
- SN1987A-γ (low mass ALP conversion) [125, 123]
- SN1987A-γ,ν (high mass ALPs) [126, 127, 87]
- SN1987A (PVO) [128]
- Low-energy supernovae (ALP decay) [87]
- Solar basin (NuSTAR) [129]
- Solar basin (NuSTAR and SPHINX) [130]
- Star clusters [131]
- SPT [132]
- Telescopes (Haystack) [133]
- Telescopes (MUSE) [134] (updated from: [135])
- Telescopes (VIMOS) [136]
- Telescopes (HST) [137, 138]
- Telescopes (JWST) [139]
- Fermi galactic SN (projection) [140]
- THESEUS (projection) [141]
- WINERED (projection) [142]
- eROSITA (projection) [143]
- White dwarf initial-final mass relation [144]
- XMM-Newton (decaying DM ALPs) [145]

Cosmology

- Ionisation fraction, EBL, X-rays [146]
- BBN+$N_{\rm eff}$ [147]
- Freeze in [148]

2 Heavy ALP-photon coupling

- ATALS (PbPb) [149]
- BaBar [150]
- Beam dump [151, 152, 150, 153, 154]
- Belle II [155]
- BESIII [156]
- CMS (PbPb) [157]
- LEP [158]
- LHC (pp)[159]
- MiniBooNE [160]
- NOMAD [161]
- OPAL [159]
- PrimEx [162, 163]
- CONUS (projection) [164]
- DUNE (projection) [165]
- FASER LLP (projection) [166]

3 Axion-electron

- EDELWEISS [167]
- Magnon non-demolition [168]
- DarkSide-50 [169]
- GERDA [170]
- LUX [171]
- Panda-X [172]
- SuperCDMS [173]
- XENON1T [174, 175]
- XENONnT [176]
- XENON1T (Solar basin) [177]
- Red giants (ωCen) [178]
- NV Centers (projection) [179]
- Solar neutrinos [180]
- Magnons (projection) [181]
- Polaritons (projection) [182]
- DARWIN (projection) [183]
- LZ (projection) [184]
- QUAX [185, 186]
- Semiconductors (projection) [187]
- White dwarf hint [188]
- Freeze-in irreducible axions [148]
- X-rays (1-loop decay) [189]

4 Axion-nucleon

Note: CASPEr and nEDM limits account for stochastic correction reported in [190]

- Casimir effect (fifth force) [191]
- CASPEr-ZULF-Comagnetometer [192]
- CASPEr-ZULF-Sidechain [193]
- ChangE [194, 195]
- Hefei Spin-based amplifiers [196]
- nEDM (ultracold neutrons and mercury) [197]
- NASDUCK [198, 199]
- PSI HgM (nEDM) [200]
- K-3He comagnetometer (fifth force) [201]
- K-3He comagnetometer (dark matter) [202]
- JEDI [203]
- Old comagnetometers [204]
- Torsion balance [205]
- Neutron star cooling [206] (corrected from [207])
- SN1987A Cooling [208, 209]
- SNO (deuterium dissasociation) [210]
- Proton storage ring (projection) [211]
- Electrostatic storage ring (projection) [212]
- DM comagnetometer (projection) [204]
- CASPEr-gradient (projection) [193]
- Superfluid helium-3 HPD (projection) [213]
- MnCO3 (projection) [214]

5 Axion-EDM

- Axinovae [215]
- Beam EDM [216]
- BBN (dark matter) [217]
- CASPEr-electric [218]
- nEDM [197]
- HfF$^+$ [219]
- JEDI [203]
- Rb/Quartz [220]
- SN1987A [221]
- *Planck*+BAO thermal axion bound [222]
- CASPEr-electric (projection) [223]
- Storage Ring EDM (projection) [223]
- Polarisation haloscope (projection) [224]

6 Axion-top

Axion-top coupling limits originally compiles in Ref. [225]

7 Axion mass versus f_a

- BBN (dark matter) [217]
- Beam EDM [216]
- Binary pulsars and Solar core constraint on $\bar{\theta}$ [226]. I include minor numerical corrections made by [227, 228].
- GW170817 [229]
- HfF$^+$ [219]
- Rb/Quartz [220]
- JEDI [203]
- nEDM [197]
- Piezoaxionic effect (projection) [230]
- *Planck*+BAO thermal axion bound [222]
- SN1987A [221]
- Neutron stars (projection) [226].
- NS-NS and NS-BH Inspirals (projection) [226].
- White dwarfs [231]
- Polarisation haloscope (projection) [224]

7.1 Black hole superradiance

- Baryakhtar et al. [232] (just Stellar mass BHs)
- Mehta et al. [232] (Stellar mass and SMBHs)
- Stott [233]
- Ünal et al. [234] (Quasars)
- Cardoso et al. [235] (dark photon)

8 Axion theory predictions

8.1 Post-inflation QCD axion

- Ballesteros et al. [236]
- Buschmann et al. 2020 [237]
- Buschmann et al. 2021 [238]
- Bonati et al. [239]
- Borsanyi et al. [240]
- Berkowitz et al. [241]
- Dine et al. [242]
- Petreczky et al. [243]
- Fleury & Moore [244]
- Klaer & Moore [245]
- Gorghetto et al. [246]
- Saikawa et al. [71]

8.2 Other dark matter predictions

- ALP Cogenesis [247]
- Early matter domination [248]
- Post-inflation ALP misalignment [249, 250]
- Trapped misalignment ($\mathcal{Z}_\mathcal{N}$ axion) [227]

9 CP-violating couplings

Combined constraints [251]

Scalar-nucleon

- Red giants [252]
- MICROSCOPE [253].
- Eot-Wash [254, 255, 256]
- Irvine [257]. Corrected to 2σ limit by [258]
- HUST [259, 260, 261, 262].
- Stanford [263]
- IUPUI [264].
- Wuhan [258]

Pseudoscalar-electron

- Red giants [252]
- Eot-wash [265]
- NIST [266]
- SMILE [267].
- QUAX [268, 269, 270]
- Washington [271, 272].
- XENON1T [273]
- ACME (projection) [274]
- Magnon (projection) [182]
- QUAX (projection) [268].

Pseudoscalar-nucleon

- Neutron star cooling [206]
- Hefei (Earth) [275]
- Hefei (mm) [276]
- Washington [277]. Limit taken from [278].
- SMILE [267].
- Mainz [279]
- Moon/Sun [280]
- Yb trap (projection) [274]
- ARIADNE (projection) [281]
- CASPEr-wind (projection) [223]
- DM comagnetometer (projection) [204]
- Fifth force Ne-Rb-K comagnetometer (projection) [282]

10 Scalars

Scalar-photon

- Globular clusters [96]
- Eot-Wash (EP) [283]
- Fifth force [284, 285, 286, 287]
- MICROSCOPE [253]
- AURIGA [288]
- BACON [289]
- Cs/Cav [290]
- DAMNED [291]
- Dy/Dy [292]
- Dy/Quartz [220]
- Dynamic Decoupling [293]
- GEO600 [294]
- LIGO O3 [295]
- Holometer [296]
- H/Quartz/Sapphire [297]
- PTB (Yb+, Sr clock) [298]
- I_2 [299]
- Rb/Cs [300]
- Sr/Si [301]
- Yb/Sr [302]
- AEDGE (projection) [303]
- AION (projection) [303]
- DUAL (projection) [304]
- MAGIS (projection) [305]
- Nuclear clock (projection) [306]
- Mechanical Resonators (projection) [307]

Scalar-electron

- Red giants [252]
- White dwarfs [308]
- Eot-Wash (EP) [283]
- Fifth force [284, 285, 286, 287]
- MICROSCOPE [253]
- AURIGA [288]
- Cs/Cav [290]
- DAMNED [291]
- GEO600 [294]
- Holometer [296]
- H/Quartz/Sapphire [297]
- I_2 [299]
- H/Si [301]
- Rb/Quartz [220]
- Yb/Cs [309]
- LIGO O3 [295]
- NANOGrav 15-year PTA [310]
- FOCOS (nuclear clock projection) [311]
- AEDGE (projection) [303]
- AION (projection) [303]
- DUAL (projection) [304]
- HELIOS (projection) [312]
- Optical microwave clock (projection) [313]
- Optical cavities [314]
- SrOH [315]
- Mechanical Resonators (projection) [307]
- IPTA (mock data) [316]

11 Vectors

B-L coupling

- Casimir [317, 318, 319]
- Eot-Wash (EP) [320]
- Eot-Wash (ISL) [321]
- MICROSCOPE [322]
- DM stability [323]
- Horizontal branch [252]
- Sun [252]
- Eot-Wash (DM) [324]
- LIGO (O1) [325]
- LIGO/VIRGO [325]
- LISA Pathfinder [326, 327]
- PPTA [328]
- Asteroids (projection) [329]
- HELIOS (projection) [312]
- LISA (projection) [329]
- MAGIS (projection) [305]
- Optomechanical membranes (projection) [330]
- SKA (projection) [331]
- Torsion balance (projection) [331]
- STE-QUEST (projection) [332]

12 Dark photons

Combined constraints [333]

SM photon-DP transitions

- Coulomb [334, 335, 336, 337, 338],
- Plimpton & Lawton's experiment [339, 338]
- Atomic spectroscopy [340]
- Atomic force microscopy (AFM) [338]
- Static magnetic field of the Earth [341, 342, 343]
- Static magnetic field of Jupiter [344, 343].
- ALPs [62]
- ALPS-II (projection) [345]
- SPring-8 [346]
- UWA-LSW [347, 348]
- ADMX-LSW [349]
- CROWS [65].
- DarkSRF [350]
- DarkSRF (projection) [351]
- TEXONO [352]
- Crab nebula [353]
- COBE and FIRAS [354]
- STAX (projection) [355]

Production in stars

- CAST [356]
- SHIPS [357]
- HINODE [358]
- New globular cluster bound [359]
- Old stellar bounds: Solar-L, HB and RG stars [360] (see also [361])
- Neutron stars [362]
- Solar neutrinos [363]
- XENON1T [364]

Dark matter cosmology/astro

- Arias et al. [249]
- Witte et al. [365, 366]
- Caputo et al. [367, 354],
- ISM [368],
- Leo T dwarf [369]
- Gas clouds [369, 370]

Dark matter experiments

- Reinterpreted axion limits [333]
- ALPHA [44]
- AMAILS [371]
- BRASS-p [372]
- BREAD (projection) [47]
- DarkSide-50 [169]
- DAMIC [373]
- Dark E-field Radio [374]
- DM Pathfinder [375]
- DOSUE-RR [376, 377]
- FAST Radio antenna [378]
- FUNK [379]
- GigaBREAD [380]
- LAMPOST [381]
- LOFAR (solar corona) [382]
- MuDHI [383]
- ORGAN [384]
- ORPHEUS [385]
- QUALIPHIDE [386]
- Quantum cyclotron [387]
- SENSEI [388]
- SHUKET [389]
- SuperCDMS [390]
- SuperMAG [391, 392]
- SQuAD [393],
- SQMS [394],
- SUPAX [395]
- SRF scanning [396]
- Tokyo dish antennae experiments [397, 398, 399]
- WISPDMX [400]
- XENON(100,1T,nT) [187, 273, 401, 402, 364, 403].

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