

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]
- CAST-CAPP [16]
- DANCE [17]
- BASE [18]
- GrAHal [19]
- HAYSTAC [20, 21, 22]
- ORGAN [23, 24]
- QUAX [25, 26, 27]
- RADES [28]
- RBF [29]
- SHAFT [30]
- TASEH [31]
- SuperMAG [32]
- UF [33]
- UPLOAD-DOWNLOAD [34, 35]
- ABRACADABRA (projection) [36]
- ADBC (projection) [37]
- ADMX (projection) [38]
- aLIGO (projection) [39]
- ALPHA (projection) [40, 41]
- BRASS (projection) [42]
- BREAD (projection) [43]
- CADEX (projection) [44]
- DALI (projection) [45]
- DM-Radio (projection) [46, 47]
- DANCE (projection) [48]
- LAMPOST (projection) [49]
- MADMAX (projection) [50]
- FLASH (projection) [51, 52]
- QUAX (projection) [53]
- ORGAN (projection) [23]
- TOORAD (projection) [54]
- Twisted Anyon Cavity (projection) [55]
- WISPLC (projection) [56]
- WISPMI (projection) [57]
- SRF heterodyne cavity (projection) [58]

LSW/Helioscopes

- ALPS [59]
- CAST [60, 61]
- CROWS [62]
- OSQAR [63]
- PVLAS [64]
- SAPPHIRES [65, 66]
- ALPS-II (projection) [67]
- IAXO (projection) [68]
- IAXO (Galactic SN) [69]

Astro

- Axion star explosions [70]
- Betelgeuse [71]
- BICEP/KECK [72]
- Breakthrough Listen (Doppler shifted radio line in MW) [73]
- Bullet Cluster (archival radio data) [74]
- Cosmic IR background (hint) [75]
- Chandra (Hydra) [76]
- Chandra (M87) [77]
- Chandra (NG7 1275) [78]
- Chandra (H1821+643) [79]
- CMB Anisotropies [80, 81]
- COBE/FIRAS+Planck spectral dist. [82]
- Diffuse gamma-rays [83]
- Diffuse SN ALPs [84] (see also [85])
- Distance ladder [86]
- Fermi-LAT (NGC 1275) [87]
- Fermi-LAT (Extragalactic SNe) [88]

- Fermi-LAT (Quasars) [89]
- Gamma-ray attenuation (ALP dark matter) [90]
- Globular clusters (R parameter) [91]
- Globular clusters (R_2 parameter) [92]
- HAWC (TeV Blazars) [93]
- HESS (PKS 2155-304) [94]
- INTEGRAL (ALP decay) [95]
- Leo T gas temperature [96]
- Magnetic white dwarfs (X-rays) [97]
- Magnetic white dwarf (polarization) [98]
- MOJAVE [99]
- Mrk 421 (ARGO-YBJ+Fermi): [100]
- Mrk 421 (ARGO-YBJ+MAGIC): [101]
- Neutron Stars (Foster et al. 2020) [102]
- Neutron Stars (Darling 2020) [103]
- Neutron Stars (Battye et al. 2021) [104]
- Neutron stars (Foster et al. 2022) [105]
- Neutron Stars (Battye et al. 2023) [106]
- NuSTAR (decaying dark matter, recast from Sterile nu) [107, 108, 109]
- Planck cosmic birefringence [110]
- POLARBEAR [111]
- PPTA+QUIJOTE [112]
- Pulsar polarisation arrays (projection) [113]
- Pulsar polar cap [114]
- Red supergiant [115]
- Solar neutrinos [116]
- SN1987A- γ (ALP decay) [117, 118, 119]
- SN1987A- γ (low mass ALP conversion) [120, 118]
- SN1987A- γ, ν (high mass ALPs) [121, 122, 83]
- Low-energy supernovae (ALP decay) [83]
- Solar basin (NuSTAR) [123]
- Solar basin (NuSTAR and SPHINX) [124]
- Star clusters [125]
- SPT [126]
- Telescopes (Haystack) [127]
- Telescopes (MUSE) [128]
- Telescopes (VIMOS) [129]
- Telescopes (HST) [130, 131]
- Fermi galactic SN (projection) [132]
- THESEUS (projection) [133]
- WINERED (projection) [134]
- eROSITA (projection) [135]
- White dwarf initial-final mass relation [136]
- XMM-Newton (decaying DM ALPs) [137]

Cosmology

- Ionisation fraction, EBL, X-rays [138]
- BBN+ N_{eff} [139]
- Freeze in [140]

2 Heavy ALP-photon coupling

- ATALS (PbPb) [141]
- BaBar [142]
- Beam dump [143, 144, 142, 145, 146]
- Belle II [147]
- BESIII [148]
- CMS (PbPb) [149]
- LEP [150]
- LHC (pp)[151]
- NOMAD [152]
- OPAL [151]
- PrimEx [153, 154]
- CONUS (projection) [155]
- DUNE (projection) [156]
- FASER LLP (projection) [157]

3 Axion-electron

- EDELWEISS [158]
- Magnon non-demolition [159]
- DarkSide-50 [160]
- GERDA [161]
- LUX [162]
- Panda-X [163]
- SuperCDMS [164]
- XENON1T [165, 166]
- XENONnT [167]
- XENON1T (Solar basin) [168]
- Red giants (ω Cen) [169]
- NV Centers (projection) [170]
- Solar neutrinos [171]
- Magnons (projection) [172]
- Polaritons (projection) [173]
- DARWIN (projection) [174]
- LZ (projection) [175]
- QUAX [176, 177]
- Semiconductors (projection) [178]
- White dwarf hint [179]
- Freeze-in irreducible axions [140]
- X-rays (1-loop decay) [180]

4 Axion-nucleon

Note: CASPEr and nEDM limits account for stochastic correction reported in [181]

- Casimir effect (fifth force) [182]
- CASPEr-ZULF-Comagnetometer [183]
- CASPEr-ZULF-Sidechain [184]
- Change [185]
- Hefei Spin-based amplifiers [186]
- nEDM (ultracold neutrons and mercury) [187]
- NASDUCK [188, 189]
- PSI HgM (nEDM) [190]
- K-3He comagnetometer (fifth force) [191]
- K-3He comagnetometer (dark matter) [192]
- JEDI [193]
- Old comagnetometers [194]
- Torsion balance [195]
- Neutron star cooling [196] (corrected from [197])
- SN1987A Cooling [198, 199]
- SNO (deuterium dissasociation) [200]
- Proton storage ring (projection) [201]
- Electrostatic storage ring (projection) [202]
- DM comagnetometer (projection) [194]
- CASPEr-gradient (projection) [184]
- Superfluid helium-3 HPD (projection) [203]

5 Axion-EDM

- Axinovae [204]
- Beam EDM [205]
- BBN (dark matter) [206]
- CASPEr-electric [207]
- nEDM [187]
- HfF^+ [208]
- JEDI [193]
- Rb/Quartz [209]
- SN1987A [210]
- *Planck*+BAO thermal axion bound [211]
- CASPEr-electric (projection) [212]
- Storage Ring EDM (projection) [212]

6 Axion mass versus f_a

- BBN (dark matter) [206]
- Beam EDM [205]
- Binary pulsars and Solar core constraint on $\bar{\theta}$ [213]. I include minor numerical corrections made by [214, 215].
- GW170817 [216]
- HfF^+ [208]
- Rb/Quartz [209]
- JEDI [193]
- nEDM [187]
- Piezoaxionic effect (projection) [217]
- *Planck*+BAO thermal axion bound [211]
- SN1987A [210]
- Neutron stars (projection) [213].
- NS-NS and NS-BH Inspirals (projection) [213].
- White dwarfs [218]

6.1 Black hole superradiance

- Baryakhtar et al. [219] (just Stellar mass BHs)
- Mehta et al. [219] (Stellar mass and SMBHs)
- Stott [220]
- Ünal et al. [221] (Quasars)
- Cardoso et al. [222] (dark photon)

7 Axion theory predictions

7.1 Post-inflation QCD axion

- Ballesteros et al. [223]
- Buschmann et al. 2020 [224]
- Buschmann et al. 2021 [225]
- Bonati et al. [226]
- Borsanyi et al. [227]
- Berkowitz et al. [228]
- Dine et al. [229]
- Petreczky et al. [230]
- Fleury & Moore [231]
- Klaer & Moore [232]
- Gorghetto et al. [233]
- Saikawa et al. [68]

7.2 Other dark matter predictions

- ALP Cogenesis [234]
- Early matter domination [235]
- Post-inflation ALP misalignment [236, 237]
- Trapped misalignment (\mathcal{Z}_N axion) [214]

8 CP-violating couplings

Combined constraints [238]

Scalar-nucleon

- Red giants [239]
- MICROSCOPE [240].
- Eot-Wash [241, 242, 243]
- Irvine [244]. Corrected to 2σ limit by [245]
- HUST [246, 247, 248, 249].
- Stanford [250]
- IUPUI [251].
- Wuhan [245]

Pseudoscalar-electron

- Red giants [239]
- Eot-wash [252]
- NIST [253]
- SMILE [254].
- QUAX [255, 256, 257]
- Washington [258, 259].
- XENON1T [260]
- Magnon (projection) [173]
- QUAX (projection) [255].

Pseudoscalar-nucleon

- Neutron star cooling [196]
- Hefei (Earth) [261]
- Hefei (mm) [262]
- Washington [263]. Limit taken from [264].
- SMILE [254].
- Mainz [265]
- Moon/Sun [266]
- ARIADNE (projection) [267]
- CASPEr-wind (projection) [212]
- DM comagnetometer (projection) [194]
- Fifth force Ne-Rb-K comagnetometer (projection) [268]

9 Scalars

Scalar-photon

- Globular clusters [92]
- Eot-Wash (EP) [269]
- Fifth force [270, 271, 272, 273]
- MICROSCOPE [240]
- AURIGA [274]
- BACON [275]
- Cs/Cav [276]
- DAMNED [277]
- Dy/Dy [278]
- Dy/Quartz [209]
- Dynamic Decoupling [279]
- GEO600 [280]
- LIGO O3 [281]
- Holometer [282]
- H/Quartz/Sapphire [283]
- PTB (Yb+, Sr clock) [284]
- I₂ [285]
- Rb/Cs [286]
- Sr/Si [287]
- Yb/Sr [288]
- AEDGE (projection) [289]
- AION (projection) [289]
- DUAL (projection) [290]
- MAGIS (projection) [291]
- Nuclear clock (projection) [292]
- Mechanical Resonators (projection) [293]

Scalar-electron

- Red giants [239]
- White dwarfs [294]
- Eot-Wash (EP) [269]
- Fifth force [270, 271, 272, 273]
- MICROSCOPE [240]
- AURIGA [274]
- Cs/Cav [276]
- DAMNED [277]
- GEO600 [280]
- Holometer [282]
- H/Quartz/Sapphire [283]
- I₂ [285]
- H/Si [287]
- Rb/Quartz [209]
- Yb/Cs [295]
- LIGO O3 [281]
- NANOGrav 15-year PTA [296]
- FOCOS (nuclear clock projection) [297]
- AEDGE (projection) [289]
- AION (projection) [289]
- DUAL (projection) [290]
- Optical microwave clock (projection) [298]
- Optical cavities [299]
- SrOH [300]
- Mechanical Resonators (projection) [293]
- IPTA (mock data) [301]

10 Vectors

B-L coupling

- Casimir [302, 303, 304]
- Eot-Wash (EP) [305]
- Eot-Wash (ISL) [306]
- MICROSCOPE [307]
- DM stability [308]
- Horizontal branch [239]
- Sun [239]
- Eot-Wash (DM) [309]
- LIGO (O1) [310]
- LIGO/VIRGO [310]
- LISA Pathfinder [311]
- PPTA [312]
- Asteroids (projection) [313]
- LISA (projection) [313]
- MAGIS (projection) [291]
- Optomechanical membranes (projection) [314]
- SKA (projection) [315]
- Torsion balance (projection) [315]
- STE-QUEST (projection) [316]

11 Dark photons

Combined constraints [317]

SM photon-DP transitions

- Coulomb [318, 319, 320, 321, 322],
- Plimpton & Lawton's experiment [323, 322]
- Atomic spectroscopy [324]
- Atomic force microscopy (AFM) [322]
- Static magnetic field of the Earth [325, 326, 327]
- Static magnetic field of Jupiter [328, 327].
- ALPs [59]
- ALPS-II (projection) [329]
- SPring-8 [330]
- UWA-LSW [331, 332]
- ADMX-LSW [333]
- CROWS [62].
- DarkSRF [334]
- DarkSRF (projection) [335]
- TEXONO [336]
- Crab nebula [337]
- COBE and FIRAS [338]
- STAX (projection) [339]

Production in stars

- CAST [340]
- SHIPS [341]
- HINODE [342]
- New globular cluster bound [343]
- Old stellar bounds: Solar-L, HB and RG stars [344] (see also [345])
- Neutron stars [346]
- Solar neutrinos [347]
- XENON1T [348]

Dark matter cosmology/astro

- Arias et al. [236]
- Witte et al. [349, 350]
- Caputo et al. [351, 338],
- ISM [352],
- Leo T dwarf [353]
- Gas clouds [353, 354]

Dark matter experiments

- Reinterpreted axion limits [317]
- ALPHA [41]
- AMAILS [355]
- BRASS-p [356]
- BREAD (projection) [43]
- DarkSide-50 [160]
- DAMIC [357]
- Dark E-field Radio [358]
- DM Pathfinder [359]
- DOSUE-RR [360]
- FAST Radio antenna [361]
- FUNK [362]
- LAMPOST [363]
- LOFAR (solar corona) [364]
- MuDHI [365]
- ORGAN [366]
- ORPHEUS [367]
- QUALIPHIDE [368]
- Quantum cyclotron [369]
- SENSEI [370]
- SHUKET [371]
- SuperCDMS [372]
- SuperMAG [373, 374]
- SQuAD [375],
- SQMS [376],
- SRF scanning [377]
- Tokyo dish antennae experiments [378, 379, 380]
- WISPDMS [381]
- XENON(100,1T,nT) [178, 260, 382, 383, 348, 384].

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