

References for AxionLimits webpage

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1 Axion-photon

Haloscopes

- ABRACADABRA [1, 2]
- ADBC [3]
- ADMX [4, 5, 6, 7, 8]
- ADMX-Sidecar [9, 10]
- ADMX-SLIC [11]
- CAPP [12, 13, 14, 15, 16, 17, 18, 19, 20, 21]
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- DANCE [23]
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- GrAHal [25]
- HAYSTAC [26, 27, 28]
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- BRASS (projection) [57]
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- DarkGEO (projection) [61]
- DM-Radio (projection) [62, 63]
- DANCE (projection) [64]
- LAMPOST (projection) [65]
- MADMAX (projection) [66]
- FLASH (projection) [67, 68]
- QUAX (projection) [69]
- ORGAN (projection) [30]
- TOORAD (projection) [70]
- Twisted Anyon Cavity (projection) [71]
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- CAST [75, 76]
- CROWS [77]
- OSQAR [78]
- PVLAS [79]
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- GW170817 (Fermi) [113]
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- HAWC (TeV Blazars) [115]
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- PPTA+QUIJOTE [138]
- Pulsar polarisation arrays (projection) [139]
- Pulsar polar cap [140]
- PSR J0437-4715 polarisation [141]
- Red supergiant [142]
- Solar neutrinos [143]
- Stellar axion background [144]
- SN1987A- γ (ALP decay) [145, 146, 147]
- SN1987A- γ (low mass ALP conversion) [148, 146, 149]
- SN1987A- γ, ν (high mass ALPs) [150, 151, 102]
- SN1987A (PVO) [152]
- Sgr A* [153]
- Low-energy supernovae (ALP decay) [102]
- Solar basin (NuSTAR) [154]
- Solar basin (NuSTAR and SPHINX) [155]
- Super Star clusters [156]
- SPT [157]
- Telescopes (Haystack) [158]
- Telescopes (MUSE) [159] (updated from: [160])
- Telescopes (VIMOS) [161]
- Telescopes (HST) [162, 163]
- Telescopes (JWST) [164]
- Telescopes (WINERED) [165, 166]

- Telescopes (eROSITA) [167]
- Fermi galactic SN (projection) [168]
- THESEUS (projection) [169]
- eROSITA (projection) [170]
- XRISM (projection) [171]
- White dwarf initial-final mass relation [172]
- XMM-Newton (decaying DM ALPs) [173]

Cosmology

- Ionisation fraction, EBL, X-rays [174]
- BBN+ N_{eff} [175]
- Freeze in [176]

- JEDI [242]
- Old comagnetometers [203]
- Torsion balance [243]
- Neutron star cooling [244] (corrected from [245])
- SN1987A Cooling [246, 247]
- SNO (deuterium dissasociation) [248]
- Proton storage ring (projection) [249]
- Electrostatic storage ring (projection) [214]
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- Beam dump [179, 180, 178, 181, 182]
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- CMS (PbPb) [185]
- EuXFL [186]
- LEP [187]
- LHC (pp)[188]
- MiniBooNE [189]
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- OPAL [188]
- PrimEx [191, 192]
- CONUS (projection) [193]
- DUNE (projection) [194]
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5 Axion-EDM

- Axinovae [252]
- Beam EDM [253]
- BBN (dark matter) [254]
- CASPER-electric [255]
- nEDM [236]
- HfF^+ [256]
- I_2^+/Ca^+ [257]
- JEDI [242]
- Rb/Quartz [258]
- SN1987A [259]
- *Planck*+BAO thermal axion bound [260]
- CASPER-electric (projection) [261]
- Storage Ring EDM (projection) [261]
- Polarisation haloscope (projection) [262]

3 Axion-electron

- Electron g-2 [196]
- EDELWEISS [197]
- Fermionic axion interferometer [198]
- Magnon non-demolition [199]
- DarkSide-50 [200]
- GERDA [201]
- LUX [202]
- Old comagnetometers [203]
- Panda-X [204]
- Torsion pendulum (spin force) [205]
- Torsion pendulum (axion wind) [206]
- SuperCDMS [207]
- XENON1T [208, 209]
- XENONnT [210]
- XENON1T (Solar basin) [211]
- Red giants (ω Cen) [212]
- Solar neutrinos [213]
- Electron storage ring (projection) [214]
- Axion wind multilayer (projection) [215]
- Magnons (projection) [216]
- Polaritons (projection) [217]
- DARWIN (projection) [218]
- LZ (projection) [219]
- QUAX [220, 221]
- NV Centers (projection) [222]
- Superconductors (projection) [223]
- Semiconductors (projection) [224]
- Spin-orbit coupling (projection) [225]
- Torsion pendulum (projection) [226]
- YIG (projection) [216]
- White dwarf hint [227]
- Freeze-in irreducible axions [176]
- X-rays (1-loop decay) [228]

6 Axion-top

Axion-top coupling limits originally compiles in Ref. [263]

7 Axion mass versus f_a

- BBN (dark matter) [254]
- Beam EDM [253]
- Binary pulsars and Solar core constraint on $\bar{\theta}$ [264]. I include minor numerical corrections made by [265, 266].
- GW170817 [267]
- HfF^+ [256]
- Rb/Quartz [258]
- JEDI [242]
- nEDM [236]
- Tritium decay [268]
- Piezoaxionic effect (projection) [269]
- *Planck*+BAO thermal axion bound [260]
- SN1987A [259]
- Neutron stars (projection) [264].
- NS-NS and NS-BH Inspirals (projection) [264].
- White dwarfs [270]
- Polarisation haloscope (projection) [262]
- Neutron star cooling [271]

7.1 Black hole superradiance

- Baryakhtar et al. [272] (just Stellar mass BHs)
- Mehta et al. [272] (Stellar mass and SMBHs)
- Stott [273]
- Ünal et al. [274] (Quasars)
- Hoof et al. [275]
- Cardoso et al. [276] (dark photon)

4 Axion-nucleon

Note: CASPER and nEDM limits account for stochastic correction reported in [229]

- Casimir effect (fifth force) [230]
- CASPER-ZULF-Comagnetometer [231]
- CASPER-ZULF-Sidechain [232]
- ChangE [233, 234]
- Hefei Spin-based amplifiers [235]
- nEDM (ultracold neutrons and mercury) [236]
- NASDUCK [237, 238]
- PSI HgM (nEDM) [239]
- K-3He comagnetometer (fifth force) [240]
- K-3He comagnetometer (dark matter) [241]

8 Axion theory predictions

8.1 Post-inflation QCD axion

- Ballesteros et al. [277]
- Buschmann et al. 2020 [278]
- Buschmann et al. 2021 [279]
- Bonati et al. [280]
- Borsanyi et al. [281]
- Berkowitz et al. [282]
- Dine et al. [283]
- Petreczky et al. [284]
- Fleury & Moore [285]
- Klaer & Moore [286]
- Gorghetto et al. [287]
- Saikawa et al. (2019) [83]
- Saikawa et al. (2024) [288]

- Beyer et al. (2023) [289]
- Kim et al. (2024) [290]

8.2 Other dark matter predictions

- ALP Cogenesis [291]
- Early matter domination [292]
- Post-inflation ALP misalignment [293, 294]
- Trapped misalignment (\mathcal{Z}_N axion) [265]

9 CP-violating couplings

Combined constraints [295]

Scalar-nucleon

- Red giants [296]
- MICROSCOPE [297].
- Eot-Wash [298, 299, 300]
- Irvine [301]. Corrected to 2σ limit by [302]
- HUST [303, 304, 305, 306].
- Stanford [307]
- IUPUI [308].
- Wuhan [302]

Pseudoscalar-electron

- Red giants [296]
- Eot-wash [309]
- e^+e^- Penning trap [310]
- NIST [311]
- SMILE [312]
- Perihelion shift [313]
- QUAX [314, 315, 316]
- Washington [205, 317].
- XENON1T [318]
- ACME (projection) [319]
- Magnon (projection) [217]
- QUAX (projection) [314].

Pseudoscalar-nucleon

- Neutron star cooling [244]
- Hefei (Earth) [320]
- Hefei (mm) [321]
- Washington [322]. Limit taken from [323].
- SMILE [312].
- Mainz [324]
- Moon/Sun [325]
- Yb trap (projection) [319]
- ARIADNE (projection) [326]
- CASPER-wind (projection) [261]
- DM comagnetometer (projection) [203]
- Fifth force Ne-Rb-K comagnetometer (projection) [327]

10 Scalars

Scalar-photon

- Globular clusters [112]
- Eot-Wash (EP) [328]
- Fifth force [329, 330, 331, 332]
- MICROSCOPE [297]
- AURIGA [333]
- BACON [334]
- Cs/Cav [335]
- DAMNED [336]
- Dy/Dy [337]
- Dy/Quartz [258]
- Dynamic Decoupling [338]
- GEO600 [339]
- LIGO O3 [340], see also [341]
- Holometer [342]
- H/Quartz/Sapphire [343]
- PTB (Yb+, Sr clock) [344]
- I₂ [345]
- Rb/Cs [346]
- Sr/Si [347]
- Yb/Sr [348]
- AEDGE (projection) [349]
- AION (projection) [349]
- DUAL (projection) [350]
- MAGIS (projection) [351]
- Nuclear clock (projection) [352]
- Mechanical Resonators (projection) [353]

Scalar-electron

- Red giants [296]
- White dwarfs [354]
- Eot-Wash (EP) [328]
- Fifth force [329, 330, 331, 332]
- MICROSCOPE [297]
- AURIGA [333]
- Cavities [355]
- Cs/Cav [335]
- DAMNED [336]
- GEO600 [339]
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- H/Quartz/Sapphire [343]
- LIGO O3 [340], see also [341]
- I₂ [345]
- H/Si [347]
- Rb/Quartz [258]
- Yb/Cs [356]
- NANOGrav 15-year PTA [357]
- FOCOS (nuclear clock projection) [358]
- AEDGE (projection) [349]
- AION (projection) [349]
- DUAL (projection) [350]
- HELIOS (projection) [359]
- Optical microwave clock (projection) [360]
- Optical cavities [361]
- SrOH [362]
- Mechanical Resonators (projection) [353]
- IPTA (mock data) [363]

- Torsion balance (projection) [379]
- STE-QUEST (projection) [380]

11 Vectors

B-L coupling

- Casimir [364, 365, 366]
- Eot-Wash (EP) [367]
- Eot-Wash (ISL) [368]
- MICROSCOPE [369]
- DM stability [370]
- Horizontal branch [371]
- Red giant [371]
- Sun [371]
- Eot-Wash (DM) [372]
- LIGO (O1) [373]
- LIGO/VIRGO [373]
- LISA Pathfinder [374, 375]
- PPTA [376]
- Asteroids (projection) [377]
- HELIOS (projection) [359]
- LISA (projection) [377]
- MAGIS (projection) [351]
- Optomechanical membranes (projection) [378]
- SKA (projection) [379]

12 Dark photons

Combined constraints [381]

SM photon-DP transitions

- Coulomb [382, 383, 384, 385, 386],
- Plimpton & Lawton's experiment [387, 386]
- Atomic spectroscopy [388]
- Atomic force microscopy (AFM) [386]
- Static magnetic field of the Earth [389, 390, 391]
- Static magnetic field of Jupiter [392, 391].
- Jupiter B-field/Juno mission [393]
- ALPs [74]
- ALPS-II (projection) [394]
- SPring-8 [395]
- UWA-LSW [396, 397]
- ADMX-LSW [398]
- CROWS [77].
- DarkSRF [399]
- DarkSRF (projection) [400]
- TEXONO [401]
- Crab nebula [402]
- COBE and FIRAS [403]
- STAX (projection) [404]

Production in stars

- CAST [405]
- SHIPS [406]
- HINODE [407]
- IAXO (modified for longitudinal mode) [408]
- New globular cluster bound [409]
- Old stellar bounds: Solar-L, HB and RG stars [371] (see also [410])
- Neutron stars [411]
- Solar neutrinos [412]
- XENON1T [413]

Dark matter cosmology/astro

- Arias et al. [293]
- Witte et al. [414, 415]
- Caputo et al. [416, 403],
- ISM [417],
- Leo T dwarf [418]
- Gas clouds [418, 419]
- JWST [420]
- Parker Solar Probe [421]
- Planck + unWISE [422]
- INTEGRAL [423]

Dark matter experiments

- Reinterpreted axion limits [381]
- APEX [424]
- ALPHA [55]
- AMAILS [425]
- BRASS-p [426]
- BREAD (projection) [58]
- Dandelion (projection) [427]
- DarkSide-50 [200]
- DAMIC [428]
- Dark E-field Radio [429, 430]
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- DOSUE-RR [432, 433]
- FAST Radio antenna [434]
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- GigaBREAD [436]
- MADMAX [437]
- LAMPOST [438]
- LOFAR (solar corona) [439]
- MuDHI [440]
- ORGAN [441, 33]
- ORPHEUS [442]
- QUALIPHIDE [443]
- Quantum cyclotron [444]
- SENSEI [445]
- SHUKET [446]
- SuperCDMS [447]
- SuperMAG [448, 449, 45]

- SQuAD [450],
- SQMS [451],
- SUPAX [452]
- SRF scanning [453]
- Tokyo dish antennae experiments [454, 455, 456]
- WISPDMM [457]
- XENON(100,1T,nT) [458, 318, 459, 460, 413, 461].

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