

# 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]
- BASE [13]
- GrAHal [14]
- HAYSTAC [15, 16]
- ORGAN [17]
- QUAX [18, 19]
- RADES [20]
- RBF [21]
- SHAFT [22]
- SuperMAG [23]
- UF [24]
- UPLOAD-DOWNLOAD [25]
- ABRACADABRA (projection) [26]
- ADBC (projection) [27]
- ADMX (projection) [28]
- aLIGO (projection) [29]
- ALPHA (projection) [30]
- BRASS (projection) [31]
- BREAD (projection) [32]
- DM-Radio (projection) [33]
- DANCE (projection) [34]
- LAMPOST (projection) [35]
- MADMAX (projection) [36]
- KLASH (projection) [37]
- ORGAN (projection) [17]
- TOORAD (projection) [38]
- WISPLC (projection) [39]
- SRF heterodyne cavity (projection) [40]

### LSW/Helioscopes

- ALPS [41]
- CAST [42, 43]
- CROWS [44]
- OSQAR [45]
- PVLAS [46]
- SAPPHIRES [47]
- ALPS-II (projection) [48]
- IAXO (projection) [49]
- IAXO (Galactic SN) [50]

### Astro

- Betelgeuse [51]
- Breakthrough Listen (Doppler shifted radio line in MW) [52]
- Bullet Cluster (archival radio data) [53]
- Chandra (Hydra) [54]
- Chandra (M87) [55]
- Chandra (NG7 1275) [56]
- Chandra (H1821+643) [57]
- Chandra (Magnetic white dwarfs) [57]
- COBE/FIRAS+Planck spectral dist. [58]
- Diffuse SN ALPs [59] (see also [60])
- Distance ladder [61]
- Fermi-LAT (NGC 1275) [62]
- Fermi-LAT (Extragalactic SNe) [63]
- HAWC (TeV Blazars) [64]
- HESS (PKS 2155-304) [65]
- Horizontal branch [66]
- Leo T gas temperature [67]
- Magnetic white dwarf polarization [68]
- Mrk 421 (ARGO-YBJ+Fermi): [69]
- Neutron Stars (Foster et al.) [70]
- Neutron Stars (Darling) [71]
- Neutron Stars (Battye et al.) [72]
- Solar neutrinos [73]
- SN1987A- $\gamma$  [74]
- SN1987A- $\gamma$  (low mass ALPs) [75]
- SN1987A- $\gamma, \nu$  (high mass ALPs) [76]
- Star clusters [77]
- Telescopes (Haystack) [78]
- Telescopes (MUSE) [79]
- Telescopes (VIMOS) [80]
- Fermi galactic SN (projection) [81]
- THESEUS (projection) [82]
- eROSITA (projection) [83]
- White dwarf initial-final mass relation [84]
- XMM-Newton (decaying DM ALPs) [85]

### Cosmology

- Ionisation fraction, EBL, X-rays [86]
- BBN+ $N_{\text{eff}}$  [87]

## 2 Axion-electron

- EDELWEISS [88]
- Magnon non-demolition [89]
- GERDA [90]
- LUX [91]
- Panda-X [92]
- SuperCDMS [93]
- XENON1T [94, 95]
- XENON1T (Solar basin) [96]
- Red giants ( $\omega$ Cen) [97]
- Solar neutrinos [98]
- Magnons (projection) [99]
- Polaritons (projection) [100]
- DARWIN (projection) [101]
- LZ (projection) [102]
- QUAX [103, 104]
- Semiconductors (projection) [105]
- White dwarf hint [106]
- X-rays (1-loop decay) [107]

## 3 Axion-nucleon

Note: CASPER and nEDM limits account for stochastic correction reported in [108]

- CASPER-ZULF-Comagnetometer [109]
- CASPER-ZULF-Sidechain [110]
- nEDM (ultracold neutrons and mercury) [111]
- NASDUCK [112]
- K-3He comagnetometer [113]
- Old comagnetometers [114]
- Torsion balance [115]
- Hot Neutron Star (HESS J1731-347) [116]
- SN1987A Cooling [117]
- SNO (deuterium dissasociation) [118]
- Proton storage ring (projection) [119]
- DM comagnetometer (projection) [114]
- CASPER-wind (projection) [110]

## 4 Axion-EDM

- CASPER-electric [120]
- nEDM [111]
- SN1987A [121]
- CASPER-electric (projection) [122]
- Storage Ring EDM (projection) [122]

## 5 Axion mass versus $f_a$

- BBN [123]
- Binary pulsars and Solar core constraint on  $\bar{\theta}$  [124]. I include minor numerical corrections made by [125, 126].
- GW170817 [127]
- nEDM [111]
- SN1987A [128]
- Neutron stars (projection) [124].
- NS-NS and NS-BH Inspirals (projection) [124].

## 6 Axion theory predictions

### 6.1 Post-inflation QCD axion

- Ballesteros et al. [129]
- Buschmann et al. 2020 [130]
- Buschmann et al. 2021 [131]
- Bonati et al. [132]
- Borsanyi et al. [133]
- Berkowitz et al. [134]
- Dine et al. [135]
- Petreczky et al. [136]
- Fleury & Moore [137]
- Klaer & Moore [138]

### 6.2 Other dark matter predictions

- ALP Cogenesis [139]
- Early matter domination [140]
- Post-inflation ALP misalignment [141]
- Trapped misalignment ( $\mathcal{Z}_N$  axion) [125]

## 7 CP-violating couplings

Combined constraints [142]

### Scalar-nucleon

- Red giants [143]
- MICROSCOPE [144].
- Eot-Wash [145, 146, 147]
- Irvine [148]. Corrected to  $2\sigma$  limit by [149]
- HUST [150, 151, 152, 153].
- Stanford [154]
- IUPUI [155].
- Wuhan [149]

### Pseudoscalar-electron

- Red giants [143]
- Eot-wash [156]
- NIST [157]
- SMILE [158].
- QUAX [159, 160]
- Washington [161, 162].
- XENON1T [163]
- Magnon (projection) [100]
- QUAX (projection) [159].

### Pseudoscalar-nucleon

- Neutron star cooling [116]
- Washington [164]. Limit taken from [165].
- SMILE [158].
- Mainz [166]
- ARIADNE (projection) [167]
- CASPER-wind (projection) [122]
- DM comagnetometer (projection) [114]

## 8 Black hole superradiance

- Baryakhtar et al. [168] (just Stellar mass BHs)
- Mehta et al. [168] (Stellar mass and SMBHs)
- Stott [169]
- Cardoso et al. [170] (dark photon)

## 9 Dark photons

Combined constraints [171]

### SM photon-DP transitions

- Coulomb [172, 173, 174, 175, 176],
- Plimpton & Lawton's experiment [177, 176]
- Atomic spectroscopy [178]
- Atomic force microscopy (AFM) [176]
- Static magnetic field of the Earth [179, 180]
- Static magnetic field of Jupiter [181, 180].
- ALPs [41]
- SPring-8 [182]
- UWA-LSW [183, 184]
- ADMX-LSW [185]
- CROWS [44].
- TEXONO [186]
- Crab nebula [187]
- COBE and FIRAS [188]

### Production in stars

- CAST [189]
- SHIP [190]
- HB and RG stars [191]
- Neutron stars [192]
- Solar neutrinos [193]

### Dark matter cosmology/astro

- Arias et al. [141]
- Witte et al. [194, 195]
- Caputo et al. [196, 188],
- IGM [197],
- Leo T dwarf [198]
- Gas clouds [199]

### Dark matter experiments

- Reinterpreted axion limits [171]
- BREAD (projection) [32]
- DAMIC [200]
- Dark E-field Radio [201]
- DM Pathfinder [202]
- FUNK [203]
- LAMPOST [204]
- MuDHI [205]
- SENSEI [206]
- SHUKET [207]
- SuperCDMS [208]
- SuperMAG [209, 210]
- SQuAD [211],
- Tokyo dish antennae experiments [212, 213, 214]
- WISPDMS [215]
- XENON1T/XENON100 [105, 163, 216, 217].

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