

# 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]
- BASE [14]
- GrAHal [15]
- HAYSTAC [16, 17]
- ORGAN [18, 19]
- QUAX [20, 21]
- RADES [22]
- RBF [23]
- SHAFT [24]
- TASEH [25]
- SuperMAG [26]
- UF [27]
- UPLOAD-DOWNLOAD [28]
- ABRACADABRA (projection) [29]
- ADBC (projection) [30]
- ADMX (projection) [31]
- aLIGO (projection) [32]
- ALPHA (projection) [33]
- BRASS (projection) [34]
- BREAD (projection) [35]
- CADEx (projection) [36]
- DM-Radio (projection) [37, 38]
- DANCE (projection) [39]
- LAMPOST (projection) [40]
- MADMAX (projection) [41]
- FLASH (projection) [42, 43]
- QUAX (projection) [44]
- ORGAN (projection) [18]
- TOORAD (projection) [45]
- WISPLC (projection) [46]
- SRF heterodyne cavity (projection) [47]

### LSW/Helioscopes

- ALPS [48]
- CAST [49, 50]
- CROWS [51]
- OSQAR [52]
- PVLAS [53]
- SAPPHIRES [54]
- ALPS-II (projection) [55]
- IAXO (projection) [56]
- IAXO (Galactic SN) [57]

### Astro

- Betelgeuse [58]
- Breakthrough Listen (Doppler shifted radio line in MW) [59]
- Breakthrough Listen (Neutron stars) [60]
- Bullet Cluster (archival radio data) [61]
- Cosmic IR background (hint) [62]
- Chandra (Hydra) [63]
- Chandra (M87) [64]
- Chandra (NG7 1275) [65]
- Chandra (H1821+643) [66]
- Chandra (Magnetic white dwarfs) [66]
- COBE/FIRAS+Planck spectral dist. [67]
- Diffuse SN ALPs [68] (see also [69])
- Distance ladder [70]
- Fermi-LAT (NGC 1275) [71]
- Fermi-LAT (Extragalactic SNe) [72]
- Fermi-LAT (Quasars) [73]
- Globular clusters ( $R$  parameter) [74]
- Globular clusters ( $R_2$  parameter) [75]
- HAWC (TeV Blazars) [76]
- HESS (PKS 2155-304) [77]
- Leo T gas temperature [78]
- Magnetic white dwarf polarization [79]
- Mrk 421 (ARGO-YBJ+Fermi): [80]
- Neutron Stars (Foster et al.) [81]
- Neutron Stars (Darling) [82]
- Neutron Stars (Battye et al.) [83]
- Pulsar polar cap [84]
- Solar neutrinos [85]
- SN1987A- $\gamma$  [86]
- SN1987A- $\gamma$  (low mass ALPs) [87]
- SN1987A- $\gamma, \nu$  (high mass ALPs) [88]
- Low-energy supernovae (ALP decay) [89]
- Solar basin (NuSTAR) [90]
- Star clusters [91]
- Telescopes (Haystack) [92]
- Telescopes (MUSE) [93]
- Telescopes (VIMOS) [94]
- Telescopes (HST) [95]
- Fermi galactic SN (projection) [96]
- THESEUS (projection) [97]
- eROSITA (projection) [98]
- White dwarf initial-final mass relation [99]
- XMM-Newton (decaying DM ALPs) [100]

### Cosmology

- Ionisation fraction, EBL, X-rays [101]
- BBN+ $N_{\text{eff}}$  [102]

## 2 Axion-electron

- EDELWEISS [103]
- Magnon non-demolition [104]
- GERDA [105]
- LUX [106]
- Panda-X [107]
- SuperCDMS [108]
- XENON1T [109, 110]
- XENONnT [in prep.]
- XENON1T (Solar basin) [111]
- Red giants ( $\omega$ Cen) [112]
- Solar neutrinos [113]
- Magnons (projection) [114]
- Polaritons (projection) [115]
- DARWIN (projection) [116]
- LZ (projection) [117]
- QUAX [118, 119]
- Semiconductors (projection) [120]
- White dwarf hint [121]
- X-rays (1-loop decay) [122]

## 3 Axion-nucleon

Note: CASPER and nEDM limits account for stochastic correction reported in [123]

- CASPER-ZULF-Comagnetometer [124]
- CASPER-ZULF-Sidechain [125]
- nEDM (ultracold neutrons and mercury) [126]
- NASDUCK [127]
- K-3He comagnetometer [128]
- Old comagnetometers [129]
- Torsion balance [130]
- Neutron star cooling [131] (corrected from [132])
- SN1987A Cooling [133]
- SNO (deuterium dissasociation) [134]
- Proton storage ring (projection) [135]
- DM comagnetometer (projection) [129]
- CASPER-wind (projection) [125]

## 4 Axion-EDM

- Beam EDM [136]
- CASPER-electric [137]
- nEDM [126]
- HfF<sup>+</sup> [138]
- SN1987A [139]
- *Planck*+BAO thermal axion bound [140]
- CASPER-electric (projection) [141]
- Storage Ring EDM (projection) [141]

## 5 Axion mass versus $f_a$

- BBN [142]
- Beam EDM [136]
- Binary pulsars and Solar core constraint on  $\bar{\theta}$  [143]. I include minor numerical corrections made by [144, 145].
- GW170817 [146]
- HfF<sup>+</sup> [138]
- nEDM [126]
- Piezoaxionic effect (projection) [147]
- SN1987A [139]
- Neutron stars (projection) [143].
- NS-NS and NS-BH Inspirals (projection) [143].

## 6 Axion theory predictions

### 6.1 Post-inflation QCD axion

- Ballesteros et al. [148]
- Buschmann et al. 2020 [149]
- Buschmann et al. 2021 [150]
- Bonati et al. [151]
- Borsanyi et al. [152]
- Berkowitz et al. [153]
- Dine et al. [154]
- Petreczky et al. [155]
- Fleury & Moore [156]
- Klaer & Moore [157]

### 6.2 Other dark matter predictions

- ALP Cogenesis [158]
- Early matter domination [159]
- Post-inflation ALP misalignment [160]
- Trapped misalignment ( $\mathcal{Z}_{\mathcal{N}}$  axion) [144]

## 7 CP-violating couplings

Combined constraints [161]

### Scalar-nucleon

- Red giants [162]
- MICROSCOPE [163].
- Eot-Wash [164, 165, 166]
- Irvine [167]. Corrected to  $2\sigma$  limit by [168]
- HUST [169, 170, 171, 172].
- Stanford [173]
- IUPUI [174].
- Wuhan [168]

### Pseudoscalar-electron

- Red giants [162]
- Eot-wash [175]
- NIST [176]
- SMILE [177].
- QUAX [178, 179]
- Washington [180, 181].
- XENON1T [182]
- Magnon (projection) [115]
- QUAX (projection) [178].

### Pseudoscalar-nucleon

- Neutron star cooling [132]
- Washington [183]. Limit taken from [184].
- SMILE [177].
- Mainz [185]
- ARIADNE (projection) [186]
- CASPER-wind (projection) [141]
- DM comagnetometer (projection) [129]

## 8 Black hole superradiance

- Baryakhtar et al. [187] (just Stellar mass BHs)
- Mehta et al. [187] (Stellar mass and SMBHs)
- Stott [188]
- Ünal et al. [189] (Quasars)
- Cardoso et al. [190] (dark photon)

## 9 Dark photons

Combined constraints [191]

### SM photon-DP transitions

- Coulomb [192, 193, 194, 195, 196],
- Plimpton & Lawton's experiment [197, 196]
- Atomic spectroscopy [198]
- Atomic force microscopy (AFM) [196]
- Static magnetic field of the Earth [199, 200, 201]
- Static magnetic field of Jupiter [202, 201].
- ALPs [48]
- SPring-8 [203]
- UWA-LSW [204, 205]
- ADMX-LSW [206]
- CROWS [51].
- TEXONO [207]
- Crab nebula [208]
- COBE and FIRAS [209]

### Production in stars

- CAST [210]
- SHIP [211]
- HB and RG stars [212]
- Neutron stars [213]
- Solar neutrinos [214]

### Dark matter cosmology/astro

- Arias et al. [160]
- Witte et al. [215, 216]
- Caputo et al. [217, 209],
- IGM [218],
- Leo T dwarf [219]
- Gas clouds [220]

### Dark matter experiments

- Reinterpreted axion limits [191]
- BREAD (projection) [35]
- DAMIC [221]
- Dark E-field Radio [222]
- DM Pathfinder [223]
- DOSUE-RR [224]
- FAST Radio antenna [225]
- FUNK [226]
- LAMPOST [227]
- MuDHI [228]
- ORPHEUS [229]
- SENSEI [230]
- SHUKET [231]
- SuperCDMS [232]
- SuperMAG [233, 234]
- SQuAD [235],
- SQMS [236],
- Tokyo dish antennae experiments [237, 238, 239]
- WISPDMS [240]
- XENON(100,1T,nT) [120, 182, 241, 242, 243, 244].

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