**Publications** Axel Brandenburg (590407-8317)

## 1. Bibliometric information

Total number of peer-reviewed original articles: 464
Total number of citations of the peer-reviewed original articles: 29,202
H index (overall, not limited to the last 8 years): 85
i10 index (overall, not limited to the last 8 years): 406
Database used for above citation data: `https://scholar.google.se`

## 2. Selection of publications

The publication numbers refer to `https://axelbrandenburg.github.io/pub/node1.html`.

412. Pencil Code Collaboration: **Brandenburg, A.**, Johansen, A., Bourdin, P. A., +34 coauthors: 2021, "The Pencil Code, a modular MPI code for partial differential equations and particles: multipurpose and multiuser-maintained," *J. Open Source Softw.* **6**, 2807
*The PI wrote the paper and the data that were reviewed by the referees. This paper reflects the synergetic effort of the PI for making this product available to the community.*

410. Roper Pol, A., Mandal, S., **Brandenburg, A.**, Kahniashvili, T., & Kosowsky, A.: 2020, "Numerical Simulations of Gravitational Waves from Early-Universe Turbulence," *Phys. Rev. D* **102**, 083512
*The PI wrote the code with the students, ran most of the simulations, and started the paper.*

359. **Brandenburg, A.**, Kahniashvili, T., Mandal, S., Roper Pol, A., Tevzadze, A. G., & Vachaspati, T.: 2017, "Evolution of hydromagnetic turbulence from the electroweak phase transition," *Phys. Rev. D* **96**, 123528
*The PI designed the numerical experiments, developed an alternative dimensional analysis highlighting the importance of the Planck mass in achieving helical magnetic fields beyond that produced by the chiral magnetic effect. The results imply the necessity of helicity during the electroweak epoch and thus the presence of circularly polarized gravitational waves.*

350. **Brandenburg, A.**, Mathur, S., & Metcalfe, T. S.: 2017, "Evolution of coexisting long and short period stellar activity cycles," *Astrophys. J.* **845**, 79
*This paper shows that most stars younger than 3 billion years have two cycles, whose periods are separated by a factor of about six. The PI carried out the investigation and wrote most of the paper.*

344. **Brandenburg, A.**, & Kahniashvili, T.: 2017, "Classes of hydrodynamic and magnetohydrodynamic turbulent decay," *Phys. Rev. Lett.* **118**, 055102
*The PI designed a new technique (the pq diagram) to diagnose different classes of self-similar turbulent decay. These new sets of simulations form the basis for our different sets of gravitational wave experiments produced in this project. They allow us to put hydrodynamic and hydromagnetic forcings used in this project on comparable footings.*

340. **Brandenburg, A.**: 2016, "Stellar mixing length theory with entropy rain," *Astrophys. J.* **832**, 6
*This paper establishes the idea of subadiabatic convection and provides an explanation for*

*the enthalpy flux in situations where it cannot be explained as a flux down the negative gradient.*

322. **Brandenburg, A.**, Kahniashvili, T., & Tevzadze, A. G.: 2015, "Nonhelical inverse transfer of a decaying turbulent magnetic field," *Phys. Rev. Lett.* **114**, 075001
*The PI developed the hypothesis that non-helical decaying hydromagnetic turbulence has a similar spectral energy transfer than helical turbulence. The proposed $k^{-2}$ scaling with wavenumber $k$ can be tested by measuring the gravitational wave background. The extended hydrodynamic tail at small $k$ is important for the gravitational wave spectrum.*

153. **Brandenburg, A.**, & Subramanian, K.: 2005, "Astrophysical magnetic fields and nonlinear dynamo theory," *Phys. Rep.* **417**, 1–209
*The author develops the idea that magnetic helicity fluxes alleviate resistively limited inverse magnetic energy transfer. This work develops and employs the two-scale analysis as a new diagnostic techniques to be used in the present work to distinguish a hemispherically dependent $EB$ cross polarization from a global one.*

98. **Brandenburg, A.**: 2001, "The inverse cascade and nonlinear alpha-effect in simulations of isotropic helical hydromagnetic turbulence," *Astrophys. J.* **550**, 824–840
*The author uses simulations and analytic models to develop a comprehensive theory for the evolution of magnetic fields in the presence of helical turbulent driving. This type of simulations forms the basis for part of the simulations used in the present work. The author used a precursor of the* Pencil Code, *to be used in this project.*

54. **Brandenburg, A.**, Enqvist, K., & Olesen, P.: 1996, "Large-scale magnetic fields from hydromagnetic turbulence in the very early universe," *Phys. Rev. D* **54**, 1291–1300
*The author developed the idea that helical hydromagnetic turbulence leads to magnetic length scales that are much larger than what was thought at the time, namely the comoving horizon scale at the time of magnetic field generation. This work provides the basic reference for the scaled equations used in this project.*

## 3. Relevant publications from the last 8 years (2017–2025)

a. Peer-reviewed original articles (those of Sect. 2 are here omitted)

461. Vachaspati, T., & **Brandenburg, A.**: 2025, "Spectra of magnetic fields from electroweak symmetry breaking," *Phys. Rev. D* **111**, 043541

459. **Brandenburg, A.**, & Banerjee, A.: 2025, "Turbulent magnetic decay controlled by two conserved quantities," *J. Plasma Phys.* **91**, E5

458. **Brandenburg, A.**, Iarygina, O., Sfakianakis, E. I., & Sharma, R.: 2024, "Magnetogenesis from axion-SU(2) inflation," *J. Cosmol. Astropart. Phys.* **12**, 057

455. **Brandenburg, A.**, Neronov, A., & Vazza, F.: 2024, "Resistively controlled primordial magnetic turbulence decay," *Astron. Astrophys.* **687**, A186

454. Iarygina, O., Sfakianakis, E. I., Sharma, R.. & **Brandenburg, A.**: 2024, "Backreaction of axion-SU(2) dynamics during inflation," *J. Cosmol. Astropart. Phys.* **04**, 018

453. **Brandenburg, A.**, Clarke, E., Kahniashvili, T., Long, A. J., & Sun, G.: 2024, "Relic gravitational waves from the chiral plasma instability in the standard cosmological model," *Phys. Rev. D* **109**, 043534

452. Schober, J., Rogachevskii, I., & **Brandenburg, A.**: 2024, "Chiral anomaly and dynamos from inhomogeneous chemical potential fluctuations," *Phys. Rev. Lett.* **132**, 065101

450. **Brandenburg, A.**, Sharma, R., & Vachaspati, T.: 2023, "Inverse cascading for initial MHD turbulence spectra between Saffman and Batchelor," *J. Plasma Phys.* **89**, 905890606

448. **Brandenburg, A.**, Kamada, K., Mukaida, K., Schmitz, K., & Schober, J.: 2023, "Chiral magnetohydrodynamics with zero total chirality," *Phys. Rev. D* **108**, 063529

446. **Brandenburg, A.**, & Protiti, N. N.: 2023, "Electromagnetic conversion into kinetic and thermal energies," *Entropy* **25**, 1270

441. **Brandenburg, A.**, & Larsson, G.: 2023, "Turbulence with magnetic helicity that is absent on average," *Atmosphere* **14**, 932

440. **Brandenburg, A.**, Kamada, K., & Schober, J.: 2023, "Decay law of magnetic turbulence with helicity balanced by chiral fermions," *Phys. Rev. Res.* **5**, L022028

439. **Brandenburg, A.**: 2023, "Hosking integral in nonhelical Hall cascade," *J. Plasma Phys.* **89**, 175890101

436. **Brandenburg, A.**, Rogachevskii, I., & Schober, J.: 2023, "Dissipative magnetic structures and scales in small-scale dynamos," *Mon. Not. Roy. Astron. Soc.* **518**, 6367–6375

435. **Brandenburg, A.**, Zhou, H., & Sharma, R.: 2023, "Batchelor, Saffman, and Kazantsev spectra in galactic small-scale dynamos," *Mon. Not. Roy. Astron. Soc.* **518**, 3312–3325

433. Zhou, H., Sharma, R., & **Brandenburg, A.**: 2022, "Scaling of the Hosking integral in decaying magnetically-dominated turbulence," *J. Plasma Phys.* **88**, 905880602

428. **Brandenburg, A.**, & Ntormousi, E.: 2022, "Dynamo effect in unstirred self-gravitating turbulence," *Mon. Not. Roy. Astron. Soc.* **513**, 2136–2151

423. Haugen, N. E. L., **Brandenburg, A.**, Sandin, C., & Mattsson, L.: 2022, "Spectral characterisation of inertial particle clustering in turbulence," *J. Fluid Mech.* **934**, A37

422. **Brandenburg, A.**, He, Y., & Sharma, R.: 2021, "Simulations of helical inflationary magnetogenesis and gravitational waves," *Astrophys. J.* **922**, 192

421. **Brandenburg, A.**, & Sharma, R.: 2021, "Simulating relic gravitational waves from inflationary magnetogenesis," *Astrophys. J.* **920**, 26

419. **Brandenburg, A.**, Clarke, E., He, Y., & Kahniashvili, T.: 2021, "Can we observe the QCD phase transition-generated gravitational waves through pulsar timing arrays?" *Phys. Rev. D* **104**, 043513

417. **Brandenburg, A.**, Gogoberidze, G., Kahniashvili, T., Mandal, S., & Roper Pol, A., & Shenoy, N.: 2021, "The scalar, vector, and tensor modes in gravitational wave turbulence simulations," *Class. Quantum Grav.* **38**, 145002

408. **Brandenburg, A.**: 2020, "Hall cascade with fractional magnetic helicity in neutron star crusts," *Astrophys. J.* **901**, 18

405. **Brandenburg, A.**, Durrer, R., Huang, Y., Kahniashvili, T., Mandal, S., & Mukohyama S.: 2020, "Primordial magnetic helicity evolution with a homogeneous magnetic field from inflation," *Phys. Rev. D* **102**, 02353

404. **Brandenburg, A.**, & Furuya, R. S.: 2020, "Application of a helicity proxy to edge-on galaxies," *Mon. Not. Roy. Astron. Soc.* **496**, 4749–4759

402. **Brandenburg, A.**, & Brüggen, M.: 2020, "Hemispheric handedness in the Galactic synchrotron polarization foreground," *Astrophys. J. Lett.* **896**, L14

400. **Brandenburg, A.**, & Boldyrev, S.: 2020, "The turbulent stress spectrum in the inertial and subinertial ranges," *Astrophys. J.* **892**, 80

399. **Brandenburg, A.**, & Chen, L.: 2020, "The nature of mean-field generation in three classes of optimal dynamos," *J. Plasma Phys.* **86**, 905860110

398. **Brandenburg, A.**, & Scannapieco, E.: 2020, "Magnetic helicity dissipation and production in an ideal MHD code," *Astrophys. J.* **889**, 55

395. **Brandenburg, A.**, & Das, U.: 2020, "The time step constraint in radiation hydrodynamics," *Geophys. Astrophys. Fluid Dyn.* **114**, 162–195

390. **Brandenburg, A.**: 2019, "A global two-scale helicity proxy from $\pi$-ambiguous solar magnetic fields," *Astrophys. J.* **883**, 119

387. **Brandenburg, A.**, & Rempel, M.: 2019, "Reversed dynamo at small scales and large magnetic Prandtl number," *Astrophys. J.* **879**, 57

386. **Brandenburg, A.**: 2019, "Ambipolar diffusion in large Prandtl number turbulence," *Mon. Not. Roy. Astron. Soc.* **487**, 2673–2684

383. **Brandenburg, A.**, Kahniashvili, T., Mandal, S., Roper Pol, A., Tevzadze, A. G., & Vachaspati, T.: 2019, "Dynamo effect in decaying helical turbulence," *Phys. Rev. Fluids* **4**, 024608

380. **Brandenburg, A.**, Bracco, A., Kahniashvili, T., Mandal, S., Roper Pol, A., Petrie, G. J. D., & Singh, N. K.: 2019, "$E$ and $B$ polarizations from inhomogeneous and solar surface turbulence," *Astrophys. J.* **870**, 87

378. **Brandenburg, A.**: 2018, "Magnetic helicity and fluxes in an inhomogeneous $\alpha^2$ dynamo," *Astron. Nachr.* **339**, 631–640

377. **Brandenburg, A.**, & Oughton, S.: 2018, "Cross-helically forced and decaying hydromagnetic turbulence," *Astron. Nachr.* **339**, 641–646

371. **Brandenburg, A.**: 2018, "Advances in mean-field dynamo theory and applications to astrophysical turbulence," *J. Plasma Phys.* **84**, 735840404

369. **Brandenburg, A.**, Durrer, R., Kahniashvili, T., Mandal, S., & Yin, W. W.: 2018, "Statistical properties of scale-invariant helical magnetic fields and applications to cosmology," *J. Cosmol. Astropart. Phys.* **08**, 034

367. **Brandenburg, A.**, Haugen, N. E. L., Li, X.-Y., & Subramanian, K.: 2018, "Varying the forcing scale in low Prandtl number dynamos," *Mon. Not. Roy. Astron. Soc.* **479**, 2827–2833

362. **Brandenburg, A.**, & Giampapa, M. S.: 2018, "Enhanced stellar activity for slow antisolar differential rotation?" *Astrophys. J. Lett.* **855**, L22

346. **Brandenburg, A.**: 2017, "Analytic solution of an oscillatory migratory $\alpha^2$ stellar dynamo," *Astron. Astrophys.* **598**, A117

b. Peer-reviewed conference contributions (results not included elsewhere)

C.86. Kahniashvili, T., **Brandenburg, A.**, Kosowsky, A., Mandal, S., & Roper Pol, A.: 2020, "Magnetism in the early universe," in *Astronomy in Focus, Vol. 14*, ed. M. T. Lago, ed., Proc. IAU Symp. A30, pp. 295–298

d. Research review articles

443. **Brandenburg, A.**, & Ntormousi, E.: 2023, "Galactic Dynamos," *Annu. Rev. Astron. Astrophys.* **61**, 561–606

B.40. **Brandenburg, A.**: 2020, "Magnetic field evolution in solar-type stars," in *IAUS 354: Solar and Stellar Magnetic Fields: Origins and Manifestations*, ed. A. Kosovichev, K. Strassmeier & M. Jardine, Proc. IAU Symp., Vol. **354**, pp. 169–180

e. Peer-reviewed books and book chapters

B.43. **Brandenburg, A.**, Larsson, G.: 2024, "Turbulence with magnetic helicity that is absent on average" in *Turbulence from Earth to Planets, Stars and Galaxies—Commemorative Issue Dedicated to the Memory of Jackson Rea Herring*, ed. B. Galperin, A. Pouquet, & P. Sullivan, MDPI Books, pp. 123–139

B.42. **Brandenburg, A.**: 2022, "Chirality in Astrophysics" in *Proceedings to Nobel Symposium 167: Chiral Matter*, ed. E. Babaev, D. Kharzeev, M. Larsson, A. Molochkov, & V. Zhaunerchyk, World Scientific, pp. 15–35

B.41. **Brandenburg, A.**: 2021, "Homochirality: a prerequisite or consequence of life?" in *Prebiotic Chemistry and the Origin of Life*, ed. A. Neubeck, & S. McMahon, Springer, pp. 87–115

f. Other publications including popular science books/presentations

E.39. **Brandenburg, A.**: 2014, "Sökandet efter en ny teori för solfläckar," *Fysikaktuellt* **2014-1**, 22–23, `http://www.fysikersamfundet.se/Fysikaktuellt/2014_1.pdf`