# CURRICULUM VITA
## Yuhong Fan

## EDUCATION:

### Degrees

1993, Ph.D., Astronomy, Institute for Astronomy, University of Hawaii at Manoa

1991, M.S., Astronomy, Institute for Astronomy, University of Hawaii at Manoa

1989, B.S., Space Physics, Beijing University, P.R. of China

### Title of Ph.D. Thesis

"Dynamic Evolution of Emerging Magnetic Flux Tubes in the Solar Convective Envelope"

## POST-DEGREE APPOINTMENTS:

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|---|---|
| 2008 - present | Senior Scientist,<br>High Altitude Observatory,<br>National Center for Atmospheric Research |
| 2004-2008 | Scientist III, High Altitude Observatory, National Center for Atmospheric Research |
| 2001-2004 | Scientist II, High Altitude Observatory, National Center for Atmospheric Research |
| 1998-2000 | Scientist I, High Altitude Observatory, National Center for Atmospheric Research |
| 1996-1997 | Research Associate, JILA, Univ. of Colorado at Boulder |
| 1993-1996 | Research Associate, National Solar Observatory |

## HONORS & AWARDS

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|---|---|
| 2005 | "Hero of GONG" for leadership in organizing the 2005 SPD/AAS summer school on helioseismology |
| 1993 | Donald E. Billings Award in Astro-Geophysics Research |
| 1990 | Solar Physics Division Studentship Award |

## PROFESSIONAL ASSOCIATION

American Astronomical Society (AAS)

Solar Physics Division, AAS

American Geophysical Union

International Astronomical Union

## PUBLICATIONS

### Section 1. Thesis

| | |
|---|---|
| Title: | Dynamic Evolution of Emerging Magnetic Flux Tubes in the Solar Convective Envelope |
| Date: | October, 1993 |
| Institute: | Institute for Astronomy<br>University of Hawaii at Manoa |
| Adviser: | George Fisher (UC Berkeley) |

### Section 2. Publications in Refereed Journals

2.1. Braun, D. C., C. Lindsey, Y. Fan, and S. M. Jefferies 1992: Local acoustic diagnostics of the solar interior, *Ap. J.*, **392**, 739.

2.2. Fan, Y., G. H. Fisher, and E. E. DeLuca 1993: The origin of morphological asymmetries in bipolar active regions, *Ap. J.*, **405**, 390.

2.3. Canfield, R. C., J.-F. de la Beaujardiere, Y. Fan, K. D. Leka, B. Lites, A. N. McClymont, T. R. Metcalf, D. L. Mickey, and J.-P Wuelser 1993: The morphology of flare processes and electric currents in active regions. I. introduction and methods, *Ap. J.*, **411**, 362.

2.4. Leka, K. D., R. C. Canfield, A. N. McClymont, J.-F. de la Beaujardiere, Y. Fan, and T. Fang 1993: The morphology of flare processes and electric currents in active regions. II. NOAA active region 5747 (October 1989), *Ap. J.*, **411**, 370.

2.5. Fan, Y., G. H. Fisher, and A. N. McClymont 1994: Dynamics of emerging active region flux loops, *Ap. J.*, **436**, 907.

2.6. Fisher, G. H., Y. Fan, and R. H. Howard 1995: Comparison between theory and observation of active region tilts, *Ap. J.*, **438**, 463.

2.7. Fan, Y., D. C. Braun, and D.-Y. Chou 1995: Scattering of $p$-modes by sunspots. II. calculations of phase shifts from a phenomenological model", *Ap. J.*, **451**, 877.

2.8. Fan, Y., and G. H. Fisher 1996: Radiative heating and the buoyant rise of magnetic flux tubes in the solar interior, *Solar Phys.*, **166**, 17.

2.9. Lindsey, C., D. C. Braun, S. Jefferies, M. Woodard, Y. Fan, Y. Gu, and S. Redfield 1996: Doppler acoustic diagnostics of subsurface solar magnetic structure, *Ap. J.*, **470**, 636.

2.10. DeLuca, E. E., Y. Fan, and S. H. Saar 1997: The emergence of magnetic flux loops in sunlike stars, *Ap. J.*, **481**, 369.

2.11. Fan, Y., E. G. Zweibel, and S. R. Lantz 1998: Two-dimensional simulations of buoyantly rising, interacting magnetic flux tubes, *Ap. J.*, **493**, 480.

2.12. Braun, D. C., C. Lindsey, Y. Fan, and M. Fagan 1998: Seismic holography of solar activity, *Ap. J.*, **502**, 968.

2.13. Fan, Y., E. G. Zweibel, M. G. Linton, and G. H. Fisher 1998: The rise of kink-unstable magnetic flux tubes in the solar convection zone, *Ap. J.*, **505**, L59.

2.14. Braun, D. C., and Y. Fan 1998: Helioseismic measurements of the subsurface meridional flow, *Ap. J.*, **508**, L105.

2.15. Lantz, S. R., and Y. Fan 1999: Anelastic MHD equations for modeling solar and stellar convection zones, *Ap. J. Supp.*, **121**, 247.

2.16. Fan, Y., E. G. Zweibel, M. G. Linton, and G. H. Fisher 1999: The rise of kink-unstable magnetic flux tubes and the origin of $\delta$-configuration sunspots, *Ap. J.*, **521**, 460.

2.17. Linton, M. G., G. H. Fisher, R. B. Dahlburg, and Y. Fan 1999: Relationship of the multi-mode kink instability to $\delta$-spot formation, *Ap. J.*, **522**, 1190.

2.18. Fisher, G. H., Y. Fan, D. W. Longcope, M. G. Linton, and A. A. Pevtsov 2000: The solar dynamo and emerging flux, *Solar Phys.*, **192**, 119.

2.19. Fan, Y., and D. Gong 2000: On the twist of emerging flux loops in the solar convection zone", *Solar Phys.*, **192**, 141.

2.20. Fisher, G. H., Y. Fan, D. W. Longcope, M. G. Linton, and W. P. Abbett 2000: Magnetic flux tubes inside the sun, *Physics of Plasmas*, **7**, 2173.

2.21. Abbett, W. P., G. H. Fisher, and Y. Fan 2000: The three-dimensional evolution of rising, twisted magnetic flux tubes in a gravitationally stratified model convection zone, *Ap. J.*, **540**, 548.

2.22. Fan, Y. 2001: Non-linear growth of the 3D undular instability of a horizontal magnetic layer and the formation of arching flux tubes, *Ap. J.*, **546**, 509.

2.23. Abbett, W. P., G. H. Fisher, and Y. Fan 2001: The effects of rotation on the evolution of rising Ω-loops in a stratified model convection zone, *Ap. J.*, **546**, 1194.

2.24. Fan, Y. 2001: The emergence of a twisted Ω-tube into the solar atmosphere, *Ap. J.*, **554**, L111.

2.25. Fong, B., B.C. Low, and Y. Fan 2002: Quiescent solar prominences and magnetic-energy storage, *Ap. J.*, **571**, 987.

2.26. Fan, Y., W. P. Abbett, and G. H. Fisher 2003: The dynamic evolution of twisted magnetic flux tubes in a 3D convecting flow. I. uniformly buoyant horizontal tubes, *Ap. J.*, **582**, 1206.

2.27. Fan, Y., and S. E. Gibson 2003: The emergence of a twisted magnetic flux tube into a pre-existing coronal arcade, *Ap. J.*, **589**, L105.

2.28. Low, B.C., B. Fong, and Y. Fan 2003: The mass of a solar quiescent prominence, *Ap. J*, **594**, 1060.

2.29. Fan, Y., and S. E. Gibson 2004: Numerical simulations of three-dimensional coronal magnetic fields resulting from the emergence of twisted magnetic flux tubes, *Ap. J.*, **609**, 1123.

2.30. Manchester, W., T. Gombosi, D. DeZeeuw, and Y. Fan 2004: Eruption of a buoyantly emerging magnetic flux rope, *Ap. J.*, **610**, 588.

2.31. Abbett, W. P., G. H. Fisher, Y. Fan, and D. J. Bercik 2004: The dynamic evolution of twisted magnetic flux tubes in a 3D convecting flow II: turbulent pumping and the cohesion of Omega-loops, *Ap. J.*, **612**, 557.

2.32. Fan, Y. 2004: Magnetic fields in the solar convection zone, *Living Rev. Solar Phys.*, **1**, 1.[Online article], `http://www.livingreviews.org/lrsp-2004-1`.

2.33. Gibson, S. E., Y. Fan, C. Mandrini, G. Fisher, and P. Demoulin 2004: Observational consequences of a magnetic flux rope emerging into the corona, *Ap. J.*, **617**, 600.

2.34. Leka, K. D., Y. Fan, G. Barnes 2005: On the availability of sufficient twist in solar active regions to trigger the kink instability, *Ap. J.*, **626**, 1091.

2.35. Fan, Y. 2005: Coronal mass ejections as loss of confinement of kinked magnetic flux ropes, *Ap. J.*, **630**, 543.

2.36. Gibson, S. E., and Y. Fan 2006: The partial expulsion of a magnetic flux rope, *Ap. J.*, **637**, L65.

2.37. Fan, Y., and S. E. Gibson 2006: On the nature of the X-ray bright core in a stable filament channel, *Ap. J.*, **641**, L149.

2.38. Gibson, S. E., and Y. Fan 2006: Coronal prominence structure and dynamics: a magnetic flux rope interpretation, *JGR*, **111**, A12103, doi:10.1029/2006JA011871

2.39. Li, J., T. Amari, and Y. Fan 2007: Resolution of the 180° ambiguity in inverse horizontal magnetic field configurations, *Ap. J.*, **654**, 675

2.40. Fan, Y., and S. E., Gibson 2007: Onset of coronal mass ejections due to loss of confinement of coronal flux ropes, *Ap. J.*, **668**, 1232

2.41. Fan, Y. 2008: The three-dimensional evolution of buoyant magnetic flux tubes in the solar convective envelope, *Ap. J.*, **676**, 680

2.42. Fuller, J., S. E. Gibson, G. De Toma, and Y. Fan 2008: Observing the unobservable? Modeling coronal cavity densities, *Ap. J.*, **678**, 515

2.43. Gibson, S. E., and Y. Fan 2008: "Partially ejected flux ropes: Implications for interplanetary coronal mass ejections", *JGR*, **113**, A09103, doi:10.1029/2008JA013151

2.44. Fan, Y. 2009: "The Emergence of a Twisted Flux Tube into the Solar Atmosphere: Sunspot Rotation and the Formation of a Coronal Flux Rope", *Ap. J.*, **697**, 1529.

2.45. Malanushenko, A., Longcope, D. W., Fan, Y. and Gibson, S. E. 2009: "Additive Self Helicity as a Kink Mode Threshold", *Ap. J.*, **702**, 580

2.46. Cottaar, M., and Fan, Y. 2009: "A Model of Coronal Streamers with Underlying Flux Ropes", *Ap. J.*, **704**, 576

2.47. Fan, Y., Alexander, D., and Tian, L. 2009:"On the Origin of the Asymmetric Helicity Injection in Emerging Active Regions", *Ap. J.*, **707**, 604

2.48. Fan, Y. 2009: "Magnetic Fields in the Solar Convection Zone", *Living Rev. Solar Phys.*, **6**, (2009), 4. URL: http://www.livingreviews.org/lrsp-2009-4

2.49. Fan, Y. 2010: "On the Eruption of Coronal Flux Ropes", *Ap. J.*, **719**, 728

2.50. Birch, A. C., D. C. Braun, and Y. Fan 2010: An estimate of the detectability of rising flux tubes, *Ap. J. Lett.*, **in press**

**Section 3. Conference papers**

3.1. Canfield, R.C., Fan, Y., Leka, K.D., McClymont, A.N. and Wuelser, J.P., 1991, "Currents and Flares in a Highly Nonpotential Active Region", in *Solar Polarimetry, Proc. of the 11th NSO/SP Summer Workshop*, ed.: November, L.J., 296.

3.2. Fan, Y., Fisher, G.H., and DeLuca, E.E. 1993, "The Evolution of Anchored Magnetic Flux Loops in the Convective Envelope of the Sun", in *GONG 1992: Seismic Investigation of the Sun and the Stars*, ed. T.M. Brown (ASP Conf. Ser.; San Francisco: ASP), **42**, 89.

3.3. Fisher, G. H., Fan, Y., Longcope, D. W., and Linton, M. G. 1996, "The Dynamics of Magnetic Flux Tubes in the Solar Convection Zone - A Study of Active Region Formation", in *Proc. of the IAU Colloquium No. 153*, ed.: Y. Uchida, T. Kosugi, and H. S. Hudson (Kluwer Academic Publishers), p.329.

3.4. Fisher G. H., Longcope D. W., Linton M. G., Fan Y., and Pevtsov A. A. 1999: "The Origin and Role of Twist in Active Regions", in *Stellar Dynamos: Nonlinearity and Chaotic Flows*, ed. M. Nunez and A. Ferriz-Mas, Astronomical Society of the Pacific (San Fancisco), ASP. Conf. Series vol. 178, p35

3.5. Linton, M. G., G. H. Fisher, R. B. Dahlburg, Y. Fan, and D. W. Longcope 2001: Multi-mode kink instability as a mechanism for $\delta$-spot formation", *AdSpR*, **26**, 1781.

3.6. Abbett, W. P., Fisher, G. H., and Fan, Y. 2001, "The Emergence of Magnetic Flux in Active Regions", in *Recent Insights into the Physics of the Sun and Heliosphere – Highlights from SOHO and Other Space Missions*, IAU Symposium, Vol. 203, p. 225, eds. P. Brekke, B. Fleck, and J.B. Gurman, Astronomical Society of the Pacific (San Fancisco).

3.7. Fan, Y. 2001, "Formation of Arching Flux Tubes at the Base of the Solar Convection Zone", in *Recent Insights into the Physics of the Sun and Heliosphere – Highlights from SOHO and Other Space Missions*, IAU Symposium, Vol. 203, p. 273, eds. P. Brekke, B. Fleck, and J.B. Gurman, Astronomical Society of the Pacific (San Fancisco).

3.8. Gibson, S.E., Low, B.C., Leka, K.D., Fan, Y., and Fletcher, L. 2002: "Magnetic Flux Ropes: Would We Know One If We Saw One", in *Magnetic Coupling of the Solar Atmosphere*, Proc. of IAU Colloquium 188, ESA SP-505, p.265.

3.9. Fan, Y., and B. C. Low 2003: Dynamics of CME driven by a buoyant prominence flux tube, in *Current Theoretical Models and Future High Resolution Solar Observations: Preparing for ATST*, eds. A. A. Pevtsov and H. Uitenbroek, ASP Conference Series Vol. **286**, p.347.

3.10. Zweibel, E.G., F. Heitsch, and Y. Fan 2003: Numerical simulations of magnetic fields in astrophysical turbulence, in *Turbulence and Magnetic Fields in Astrophysics*, eds. E. Falgarone & T. Passot, Springer Lecture Notes in Physics, Vol. **614**, p.101.

3.11. Fan, Y. 2004, "Dynamics of Emerging Flux Tubes", in "The Solar-B Mission and the Forefront of Solar Physics", eds. T.Sakurai and T.Sekii, ASP Conf. Ser. Vol.325, pp.47-56.

3.12. Fan, Y., and Gibson, S. E. 2005: "Evolution of Twisted Magnetic Flux Ropes Emerging into the Solar Corona", in *Proceedings of Solar Wind 11 / SOHO 16*, "Connecting Sun and Heliosphere", Eds. T. Zurbuchen, and B. Fleck, ESA SP-592, p.241.

3.13. Fan, Y., Gibson, S.E., Manchester, W. 2005: "The Emergence and Evolution of Twisted Magnetic Flux Ropes in the Solar Corona", in *Proceedings of the International Scientific Conference on Chromospheric and Coronal Magnetic Fields*, Eds. D. Innes, A. Lagg, S. Solanki, D. Danesy ESA SP-596, Published on CDROM, p.26.1.

3.14. Gibson, S. E., Y. Fan, T. Török, and B. Kliem 2006: The evolving sigmoid: evidence for magnetic flux ropes in the corona before, during and after CMEs, in *Solar Dynamics and its Effects on the Heliosphere and Earth*, Eds. D. Baker, B. Klecker, S. Schwarts, R. Schwenn, and R. von Steiger, *Space Science Reviews*, Vol. **124**, p.131.

3.15. Fan, Y. 2009: "Modeling the subsurface evolution of active region flux tubes", in *Proceedings of the GONG 2008 / SOHO XXI conference on Solar-stellar dynamos as revealed by helio- and asteroseismology*, Eds. M. Dikpati and F. Hill, ASP conference series Vol. **416**, p.489.