A. POUQUET
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## Professional Preparation

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|---|---|---|
| University of Nice | Physics | Maîtrise de physique (B.S. equivalent), 06/1970 |
| University of Paris-VII | Physics | Thèse de troisième cycle (Master equiv.), 12/1972 |
| University of Nice | Astrophysics | Thèse d État (PhD equivalent), 12/1976 |

## Appointments

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| 2000 – present | Director, Geophysical Turbulence Program, NCAR |
| 2000 – present | Turbulence Numerics Team, Senior Scientist & Section Head |
| 2006 - 2009 | Earth and Sun System Laboratory (ESSL), Deputy Director |
| 2004 - 2006 | First ESSL Director, in an acting position (7/2004-1/2006) |
| 1998 - 09/2000 | Director of the Cassini Laboratory, Observatoire de Nice (CNRS and OCA) |
| 1974 - 2000: | Attachée de Recherche de deuxième classe, de première classe, Directrice de recherche de deuxième classe, de première classe, Centre National de la Recherche Scientifique (CNRS), Paris & Nice |
| 1973 – 1974 | Advanced Study Program post-doctoral fellow, NCAR |

## Publications in refereed journals

156 publications in international refereed journals altogether plus 5 that are submitted; 9 in 2010, 8 in 2011; one review paper in 2010, and one set of international lectures in 2009

## Synergistic Activities

- Use of movies to demonstrate turbulent structures and their dynamics for the last 15 years.
- Development of codes, and of tools for analysis / visualization of turbulence. Supervision of the development of community software (GASPAR, GHOST), and plug-in tools for turbulence.
- Associate Editor for *Journal of Computational Physics* for roughly the last twenty years.
- Built over the years, and shared with colleagues, a database for papers on turbulence.
- Organization of seminars and of workshops, both in Nice and at NCAR/GTP.
- Reviewer for ~ 20 scientific international journals over the years, for the National Science Foundation (by mail, and panel) and for various national and international review boards.
- Member of scientific and/or organizing committees for various international workshops and research agencies (ANR, CNRS, NASA, NSERC, NSF).
- Graduate-level lectures in international schools, as well as at CU (Boulder).
- First steps in putting together a national effort for a Turbulence Research Institute for Geophysical flows (TRIG), in collaboration with Fazle Hussain (U. Texas).

**Synopsis**

In order to understand the dynamics of the atmosphere and oceans, the planetary boundary layer, the solar and planetary environments and their interactions (photosphere, corona and the Solar Wind, the magnetosphere of Earth and Jupiter, or the liquid core of the Earth as the locus of the dynamo phenomenon of generation of a magnetic field from a seed), investigating relevant turbulent processes at a fundamental level is essential. This remains a major stumbling block of classical physics: a large number of spatial and temporal modes are coupled and interacting with coherent structures and waves due for example to rotation, stratification, compressibility or magnetic fields, and leading to power-law spectra, exponential wings of probability distribution functions, long-lived large-scale structures as well as extreme events and intermittency, all of which are observed in geophysical and astrophysical fluids and plasmas. The challenge is to put together a team that develops powerful new tools for the community -- harnessing the increase in theoretical and experimental advances and in the power of both computer technology and algorithms, focusing in particular on the parallelization of codes to a high number of processors and cores and on adaptive mesh refinement preserving accuracy. One must also contribute to the theoretical research in turbulence, applied mathematics and statistical physics, and build analytical, phenomenological and numerical models, of increasing complexity, and follow this path all the way to its consequences for geophysical and astrophysical flows, in particular in improved models of transport properties and extreme events statistics, such as tornadoes, hurricanes, hail storms, or coronal mass ejections and reconnection events in the heliosphere, and on the generation and dynamics of large-scale zonal flows that are observed in many instances.

**Collaborations**

*(i) Collaborators since 2008*:
Alex Alexakis, Ecole Normale Supérieure (Paris); Julien Baerenzung, MPI Postdam; Amitava Bhattacharjee, U. New Hampshire; Marc-Etienne Brachet, ENS (Paris); B. Breech, UNH; Miguel Bustamante, U. Dublin; Vincenzo Carbone, U. Calabria; Carlos Cartes, U. Santiago (Chili); John Clyne, NCAR; Francois Daviaud, CEA Saclay; P. Dmitruk, U. Buenos Aires; Bérengère Dubrulle, CEA Saclay; Bob Ergun (CU); Aimé Fournier, NCAR; Kai Germaschewski (UNH); J. Graham, JHU and LANL; D. Holm, Imperial College & LANL; Giorgio Krstulovic, Observatoire de Nice (OCA); Jean-Philippe Laval, U. Strasbourg; William Matthaeus, Bartol Research Institute; P. Mininni, NCAR; David Montgomery, Dartmouth College; Alan Norton, NCAR; Chung-Sang Ng, U. Anchorage; Jean-François Pinton, ENS (Lyon); Hélène Politano, OCA; Y. Ponty, OCA; Mark Rast (CU); Raghu Reddy, Pittsburgh; D. Rosenberg, NCAR; Sergio Servidio, U. Calabria; Peter Sullivan (NCAR/MMM); Vadim Uritsky, U. Calgary.

*(ii) Graduate and Postdoctoral advising and mentoring since 2008 (directly or in collaboration):*
A. Alexakis (now at Ecole Normale Supérieure, Paris); Jason Kok (ASP/NCAR); Shiva Kumar Malapaka (now at CEA, Saclay); Jai Sukhatme (now CAOS, Bangalore).

*(iii) Thesis advisor (directly, or in collaboration) since 2008 to:*
Julien Baerenzung, MPI Postdam; Jonathan Graham, LANL; Giorgio Krstulovic, Observatoire de Nice; Edwin Lee, Leuwen; Cecilia Rorai (Trieste and Maryland); Amrik Sen (Applied Mathematics, CU); Josh Stawarz (Space Physics, CU), Simon Thalabard (CEA, Saclay).

**LIST OF REFEREED PUBLICATIONS IN 2011**

- J. Baerenzung, P.D. Mininni, A. Pouquet and D. Rosenberg, "Spectral Modeling of Turbulent Flows and the Role of Helicity in the presence of rotation," J. Atmos. Sci., **68**, 2757 (2011).
- P. Dmitruk, P.D. Mininni, A. Pouquet, S. Servidio and W.H. Matthaeus: "On the emergence of very long time fluctuations and 1/f noise in ideal flows," Phys. Rev. E **83**, 066318 (2011).
- G. Krstulovic, M.-E. Brachet and A. Pouquet: "Alfvén waves and ideal two-dimensional Galerkin truncated MHD," Phys. Rev. E, **84**, 016410 (2011). *Fig. 9b selected for the Kaleidoscope of PRE (http://pre.aps.org/).*
- P.D. Mininni, D. Rosenberg, R. Reddy and A. Pouquet: "An hybrid MPI-OpenMP scheme for scalable parallel pseudospectral computations for fluid turbulence," Parallel Computing, **37**, 316 (2011). *Best Paper Award, Technology Track, TeraGrid conference, 2010*.
- P.D. Mininni, P. Dmitruk, W.H. Matthaeus and A. Pouquet: "Are statistical equilibria good predictors of large-scale behavior for dissipative fluids? The case of rotating turbulence," Phys. Rev. E **83**, 016309 (2011).
- J. Pietarila Graham, P.D. Mininni and A. Pouquet: "High Reynolds number MHD turbulence using a Lagrangian model," Phys. Rev. E **84**, 016314 (2011).
- J. Pietarila Graham, D. Holm, P.D. Mininni, and A. Pouquet, ``The effect of subfilter-scale physics on regularization models,'' J. Scientific Computing **41**, 21 (2011), Springer –Verlag, DOI: 10.1007/s10915-010-9428-4.
- S. Thalabard, D. Rosenberg, A. Pouquet and P.D. Mininni: "Conformal invariance in three-dimensional rotating turbulence," Phys. Rev. Lett. **106**, 204503 (2011).

**Participation to white papers in 2010**

- A. Bhattacharjee et al., "Waves and Turbulence in Space and Astrophysical Plasmas," WOPA report on theoretical issues in MHD (2010); see http://www.pppl.gov/conferences/2010/WOPA.
- E. Zweibel et al., "Astrophysical Dynamos," WOPA sub-group report on dynamo processes (2010); see http://www.pppl.gov/conferences/2010/WOPA.
- NSF Ad-Hoc Subcommittee on Funding and Governance of Future Major Multi-user Facilities, Business and Operations Advisory Committee, 2010; see http://www.nsf.gov/oirm/bocomm/.