

Princeton Center for Theoretical Science

The Princeton Center for Theoretical Science is dedicated to exploring the frontiers of theory in the natural sciences. Its purpose is to promote interaction among theorists and seed new directions in research, especially in areas cutting across traditional disciplinary boundaries.

The Center is home to a corps of Center Postdoctoral Fellows, chosen from nominations made by senior theoretical scientists around the world. A group of senior Faculty Fellows, chosen from science and engineering departments across the campus, are responsible for guiding the Center. Center activities include focused topical programs chosen from proposals by Princeton faculty across the natural sciences. The Center is located on the fourth floor of Jadwin Hall, in the heart of the campus "science neighborhood". The Center hopes to become the focus for innovation and cross-fertilization in theoretical natural science at Princeton.

Faculty Fellows

Paul Steinhardt, Director
Igor Klebanov, Associate Director
Ravindra Bhatt
Adam Burrows
Curtis Callan
Roberto Car
Salvatore Torquato
Jeroen Tromp

Center Postdoctoral Fellows

Dmitry Abanin 2008-2011
Benjamin Basso 2009-2012
Adam Brown 2009-2012
Bryan Clark 2009-2012
Mariangela Lisanti 2010-2013
M. Lisa Manning 2008-2011
Matthew Reece 2008-2011
Marco Schiro', 2010-2013
Alexander Tchekhovskoy 2010-2013
Mosahito Yamazaki 2010-2013

Associate Postdoctoral Fellows

Shravan Hanasoge 2010-2011

To find out more about Center Postdoctoral Fellowships and Programs see:

<http://pcts.princeton.edu/pcts>



Differential Rotation in Stars 9-13 May 2011

**PCTS – Jadwin Hall
Fourth Floor, Room 407**

Organizers

Steven Balbus
Mark Miesch
James Stone
Nigel Weiss

Monday, 9 May 2011

8:45-9:00 am Welcoming Remarks
S. Balbus, Ecole Normale Superieure
J. Stone, Princeton University

Please note: all talks are 40 minutes with 10 minutes for discussion unless otherwise indicated.

Helioseismic Probing of the Solar Internal Rotation

9:00 – 9:50 “Solar internal rotation from helioseismology: how do we do it?”
J. Christensen-Dalsgaard, Danish Astroseismology Center

9:50 – 10:40 “Solar internal rotation: its mean profile and temporal variations”
M. Thompson, HAO/NCAR

10:40 – 11:00 **Coffee break**

11:00 – 11:50 “The structure of the solar tachocline”
Sarbani Basu, Yale University

11:50 – 12:30 Discussion
R. Howe, NOAO

12:30 – 2:00 **Lunch on your own.**

Solar and Stellar Differential Rotation

2:00 – 2:50 “Observational Trends in Pre-Kepler Measurements of Stellar Differential Rotation”
S. Saar, Harvard Center for Astrophysics

2:50 – 3:40 “The Promise of Kepler for Studying Differential Rotation”
G. Basri, UC Berkeley

3:40 – 4:00 **Coffee break**

4:00 – 4:50 “The rotation law of G dwarfs”
M. Kueker, Astrophysikalisches Institut Potsdam

4:50 – 5:30 Discussion
P. Charbonneau, University of Montreal

Tuesday, 10 May 2011

Solar and Stellar Differential Rotation (continued)

9:00 – 9:50 “Thermal wind balance in solar-like and nonsolar convective zones.”
S. Balbus, Ecole Normale Superieure

9:50 – 10:40 “Weak and Strong Fields Dynamos, from the Earth to the stars”
E. Dormy, MAG (ENS/IPGP)

10:40 – 11:00 **Coffee break**

Convection in Rotating Fluids

11:00 – 11:50 “Anelastic convection in rapidly rotating spherical shells”
C.A. Jones, University of Leeds

11:50 – 12:40 “Discussion”

12:45 – 2:00 **Lunch on your own.**

2:00 – 2:50 “Convection and Differential Rotation in Solar-type Stars”
B. Brown, University of Wisconsin

2:50 – 3:40 “Convection and Differential Rotation in Simulations of Very Low-Mass Stars”
M. Browning, CITA

3:40 – 4:00 **Coffee break**

4:00 – 5:30 Discussion
F. Cattaneo, University of Chicago
E. Zweibel, University of Wisconsin

Wednesday, 11 May, 2011

Convection in Rotating Fluid (continued)

9:00 – 9:50 “A multi-dimensional mixing length formalism for the transport of heat and angular momentum”
P. Lesaffre, Ecole Normale Superieure

The Near Surface Shear Layer

9:50 – 10:40 “Multi-scale solar convection and its collisions in the near surface shear layer”
J. Toomre, JILA, University of Colorado

10:40 – 11:00 Coffee break

11:00 – 11:50 “Dynamical Balances in the Solar Near Surface Shear Layer”
M. Miesch, HAO/NCAR

11:50 – 12:30 Discussion
A. Kosovichev, Stanford University
M. Thompson, HAO/NCAR

FREE AFTERNOON

Thursday, 12 May 2011

Tachocline: Dynamics

9:00 – 9:50 “Magnetic Confinement of the Solar Tachocline: Coupling to a self consistent convection zone”
A.S. Brun, CEA

9:50 – 10:40 “Beta-plane MHD turbulence”
D. Hughes, University of Leeds

10:40 – 11:00 Coffee break

11:00 – 11:50 “The Omega effect: Can we study tachocline dynamics independently of other dynamics?”
N. Brummell UC Santa Cruz

11:50 – 12:30 “Direct Statistical Simulation of Tachocline Dynamics”
S. Tobias, University of Leeds

12:30 – 2:00 Lunch on your own.

Thursday, 12 May 2011 -- Afternoon

Tachocline: Confinement

2:00 – 2:50 “The Sun's meridional circulation and interior magnetic field: what can be learned from toy models”
P. Garaud, UC Santa Cruz

2:50 – 3:40 “Magnetic confinement: meridional circulation versus magnetic flux pumping”
T. Wood, UC Santa Cruz

3:40 – 4:00 Coffee break

4:00 – 4:50 “Tachocline fluid dynamics: an interim assessment”
M. McIntyre, Cambridge University

4:50 – 5:30 “Magnetic instability and angular momentum transport in radiation zones”
R. Arlt, Astrophysikalisches Institut Potsdam

7:00 pm Conference Dinner
Triumph Brewing Company
138 Nassau Street

Friday, 13 May 2011

Tachocline (continued)

9:00 – 10:00 Discussion on Tachocline Dynamics and Confinement
S. Tobias, University of Leeds

10:00 – 10:20 Coffee break

Summary

10:20 – 11:00 “What have we learnt?”
N. Weiss, Cambridge, University

11:00 – 12:00 “Closing Perspectives”
S. Balbus, Ecole Normale Superieure
M. Miesch, HAO/NCAR
J. Stone, Princeton University