# Meenakshi Dutt


| | | | |
|---|---|---|---|
| **Office Address:** | Box 90305, Duke University<br>Durham, NC 27708-0305 | **Home Address:** | 2748 Campus Walk Ave., Apt 17-H,<br>Durham, NC 27705 |
| **Phone:** | (919) 660-2549 | **Phone:** | (919) 383-5355 |
| **Email :** | md@phy.duke.edu | **Fax:** | (919) 660-2525 |


## Education

- **Duke University**, Department of Physics, Durham, NC
  **Ph.D., Physics**. (expected June 2002)
  Research Adviser: Prof. R. P. Behringer.
  Dissertation Title: Computer Simulations of Granular Media
- **Duke University**, Durham, NC
  **M.A., Physics**. (May 1999)
- **Indian Institute of Technology**, Delhi, India
  **M.Sc., Physics** (May 1996)
  Major: Optical Electronics
- **University of Delhi**, Delhi, India
  **B.Sc.** (First Class) (May 1994)
  Major: Physics. Minor: Chemistry / Mathematics

## Experience

- **Research**
  - **Duke University**, Durham, NC : (Graduate Student/ Research Assistant) Utilized the Hard Sphere Molecular Dynamics simulation technique to study multiparticle 1- and 2-dimensional granular systems. (January 1998 - present)
  - **Inter University Center for Astronomy and AstroPhysics (IUCAA)** , Pune, India : (Visiting Student) Utilized a Neural Network simulator to classify stars through their spectra while participating in a summer school for Astronomy and AstroPhysics. (May - June 1995)
  - **Indian Institute of Technology**, Delhi, India : (M.Sc. Graduate Student) Experimentally and numerically studied doped optical fibers, in a project funded by the NSF, to develop optical fiber amplifier packages and fiber lasers. (July 1995 - May 1996)
- **Teaching**
  - **Duke University**, Durham, NC : (Graduate Student/ Teaching Assistant) Taught undergraduate Physics and conducted recitation classes. (August 1996 - July 1998).

## Publications

- Painter, B., **Dutt, M.** and Behringer, R. P., "Energy Dissipation and Clustering for a Cooling Granular Material on a Substrate" (submitted to Physica D)

- **Dutt, M.** and Behringer, R. P., "Effects of Surface Friction on a Two Dimensional Granular System" (in preparation, expected March 2002)
- **Dutt, M.** and Behringer, R. P., "One Dimensional Momentum Dissipation Granular Models" (in preparation, expected March 2002)

**Presentations**

- **Dutt, M.** and Behringer, R. P., "Numerical Model of a Granular Collider Experiment", presented as a poster at the Dynamic Days '02 (DD02), Baltimore, MD, January 4-7, 2002.
- **Dutt, M.** and Behringer, R. P., "Model for a Horizontally Vibrated Granular System ", presented at the American Physical Society (APS) Division Of Fluid Dynamics (DFD) Meeting, San Diego,CA, November 18-20, 2001.
- **Dutt, M.** and Behringer, R. P., "Models of Dissipation for Grains Rolling on Static and Dynamic Substrates"
  - presented as a poster at the DD01, Chapel Hill, NC, January 3-6, 2001.
  - presented at the APS DFD Meeting, Washington, D.C., November 19-21, 2000.
  - presented at the APS DFD Meeting, New Orleans, LA, November 21-23, 1999.
  - presented at the APS South Eastern Section (SES) Meeting, Chapel Hill, NC, November, 1999.
  - presented at the APS Centennial Meeting, Atlanta, GA, March, 1999.

**Conferences and Workshops**

- DD02, Baltimore, MD, January 4-7, 2002.
- Duke University Center of Nonlinear and Complex Systems - (Naval Research Laboratory) NRL, Duke University, NC, November 30, 2001.
- APS DFD Meeting, San Diego,CA, November 18-20, 2001.
- DD01, Chapel Hill, NC, January 3-6, 2001.
- APS DFD Meeting,Washington, D.C., November 19-21, 2000.
- APS DFD Meeting,New Orleans, LA, November 21-23, 1999.
- APS SES Meeting, Chapel Hill, NC, November, 1999.
- APS Centennial Meeting, Atlanta, GA, March, 1999.
- Nuclear Science Center, one day orientation workshop, Delhi, India (February/ March 1996).
- Inter University Center for Astronomy and AstroPhysics (IUCAA), Visiting Students' Program, Pune, India (May-June 1995).

**Current Research**

The main thrust of my research has been to study the relative importance of the role of surface friction in 1- dimensional and quasi 2- dimensional granular systems as compared to the collisional mechanisms in these systems. I developed numerical models for hypothetical 1-dimensional and quasi 2-dimensional granular system which accounted for surface frictional effects and collisional interactions between particles and/or particles and walls. The numerical model ( for quasi 2-dimensional systems) was incorporated in simulations for different granular systems (cooling, driven, bound and unbound) to model different experiments. The hope of doing so was to obtain deeper insight into the dynamical and statistical processes which govern the overall behavior of these systems after testing the accuracy of our numerical results with results obtained from experiments which we modelled.

Results from the cooling quasi 2-dimensional granular systems show the particles to gradually form clusters and other interesting spatial structures (depending upon the boundaries of the system) as the constituent particles lose all their energy and momentum due to surface frictional and collisional dissipation. Preliminary results from our driven quasi 2-dimensional granular systems for a single particle shows interesting phase space diagrams. I am in the process of working on a parallel code for the multiparticle version of this system.

**Computer Skills**

- Experience with simulation and modelling, data analysis.
- Have taken graduate courses in Scientific Computing, Algorithm and Numerical Analysis.
- Proficiency in Fortran, C, Pascal and Basic. Have taken a class in C++ programming
- Knowledge of computer applications such as MatLab, Mathematica.

**Honors/ Awards**

- Dynamics Days 2002 Travel Award, January 2002
- Duke University Graduate School Travel Award, November 2001, 2000, 1999

**Professional Associations**

American Physical Society: student member; member of Division of Fluid Dynamics and Division of Computational Physics.

**Language Proficiency**

English, Spanish, Hindi, Bengali

**Interests**

- Thoroughly enjoy working on problems by comprehending the different the physical processes and their various spatiotemporal scales; working out a hierarchy of the scales to develop an effective numerical model; using the model to reproduce and gain deeper insight into the statistical and dynamical properties of the problem in hand.

- Active member of the Duke University Center of Nonlinear and Complex Systems (in addition, have taken courses on Introduction to and Advanced Nonlinear Dynamics).
- Reading; attending performing art recitals and museum exhibitions; travelling and outdoor activities.