


Title	Prof..	First Name	<b>Avinash</b>	Last Name	<b>Khare</b>	
Designation	Professor					
Department	Physics and Astrophysics					
Address (Campus) (Residence)	Department of Physics and Astrophysics University of Delhi, Delhi-7					
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Web-Page						
<b>Education</b>						
Course	Institution	Year	Details			
<b>Ph.D.</b>	<b>Physical Research lab Ahmedabad</b>	<b>1985</b>	Thesis topic: Instabilities and Turbulence in Mirror Machines			
<b>M.Sc.</b>	<b>APS University, Rewa</b>	<b>1981</b>	Subjects: Physics			
<b>B.Sc. (Hon)</b>	<b>Hindu College, Delhi University</b>	<b>1979</b>	Subjects: Physics			
<b>Career Profile</b>						
Organisation / Institution	Designation	Duration	Role			
Delhi University, Delhi	Professor	From April 2005. 2007-2009	Research and teaching			
Tata Institute of Fundamental Research Mumbai	Professor (Adj.)		Research			
<u>Foreign</u>						
Centre of Space Plasma and Aeronomic Research, NASA Huntsville, Al USA.	Professor, Scientist	2008 – 2009	Research			
Columbia University New York USA	Research Scientist	2004- 2005	Research			
University of Iowa, Iowa city USA	Research Scientist with rank of Associate Professor	2001- 2003.	Research and teaching			
University of California San Diego. USA	Scientist	1995	Research			
International Centre of Theoretical Physics, Trieste Italy	Associate	1992, 1996, 1998	Research			
JET, Culham lab, University of Oxford, UK	Research Scientist	1986-1989	Research			
India						
Institute for Plasma Research Bhat	Associate Professor II	1998-2003	Research			

Gandhinagar			
Institute for Plasma Research Bhat Gandhinagar	Associate Professor I	1993-1998	Research
Institute for Plasma Research Bhat Gandhinagar.	Fellow	1987-1993	Research
Institute for Plasma Research Bhat Gandhinagar	Research Associate	1985-1987	Research
<b>Research Interests / Specialization</b>			
<ul style="list-style-type: none"> <li>• Fusion Plasmas, Tokamak physics (equilibrium, confinement, transport and turbulence physics)</li> <li>• Non Neutral Plasmas.</li> <li>• Rocket/space propulsion</li> <li>• Laser plasma interaction</li> <li>• Astrophysics, Gravitational Collapse, Formations of Stars, Planets.</li> <li>• Dusty Plasmas and complex Plasmas, Solid-liquid phase Transitions, melting physics, Liquid-Vapor phase transition, Critical point phenomenon, Renormalization theory.</li> <li>• Phase transition and simulations of Euler fluids.</li> <li>• Non Archimedean Algebra, Computer algorithms</li> </ul>			
<b>Teaching Experience ( Subjects/Courses Taught)</b>			
<p><b>University of Delhi</b>  Statistical Mechanics  Electromagnetic Theory  M Sc Electronics lab (Previous)  Plasma Physics  Computer labs</p> <p><b>University of Iowa</b>  Modern Astronomy  Introductory Astronomy Lab  Classical Mechanics</p> <p><b>Institute for Plasma Research</b>  Mathematical Physics  Statistical Mechanics  Plasma Physics</p>			
<b>Honors &amp; Awards</b>			
<p>Fellow, Indian National Science Academy (INSA) 2011.</p> <p>Fellow, National Academy of Sciences, India, Allahabad (NASI)</p> <p>Fellow, Indian Academy of Sciences, Bangalore (IAS)</p> <p>Recipient of "Homi Bhabha Young Scientist Fellowship award" (1993-95).</p> <p>Recipient of INSA Biren Roy memorial lecture award for outstanding contributions to Physics ( 2016)</p> <p>Chairman, International advisory Committee (IAC) of the International Conference on the Physics of Dusty Plasmas (ICPDP).</p> <p>Chairman, of the 2014 ICPDP-06.</p> <p>Member, International program committee Asia Pacific Fusion Association conference</p> <p>Member, International advisory committee Plasma College, AS International center of theoretical Physics, Trieste Italy</p>			

Associate Editor, Journal of Plasma Physics (Cambridge)

Elected President of the Plasma Science Society of India 2010.

Patents "Plasma heat pump and heat engine" patent granted by United States Patent and Trade Mark Office.

Associate of International Centre of Theoretical Physics (ICTP) Trieste Italy.

My paper "Micro-propulsion in space via dust plasma thruster" was reviewed in "Research High lights" section of Nature 2007.

Member COSPAR organizing committee.

Associate IUCAA, Pune

My paper entitled "Effect of an external magnetic field on a critical point for phase separation in a dusty plasma" has been chosen as the most influential paper published in Physics Scripta in 2012.

Vice-President, Plasma Science Society of India (2000-2002).

Awarded Theoretical Physics Seminar Circuit Project of the Department of Science and technology 1998-2002.

Merit scholarship of the board of secondary education Bhopal (M.P)

#### Publications

##### In Indexed/ Peer Reviewed Journals

Suppression of stimulated Brillouin instability of a beat-wave of two lasers in multiple-ion-species plasmas. Pinki Yadav, D. N. Gupta and **K. Avinash**. Phys. Plasmas **23**, 012110 (2016).

Effects of dust correlations on the marginal stability of ion stream driven Dust Acoustic waves, Manish K Shukla and **K Avinash**, Physica Scripta, Volume 91, Number 6 (2016).

Plasma heating via adiabatic magnetic compression-expansion cycle, **K. Avinash**, M. Sengupta and R. Ganesh, to appear in Phys. Plasmas.( July 2016).

Coulomb fission of dusty plasma cloud, R. L. Merlino, J. K. Meyer, **K. Avinash** and A. Sen, Phys. Plasmas **23**, 064506 (2016).

K. Avinash and A. Sen, Rayleigh-Taylor Instability in dusty plasma experiment, 2015 (in Print Phys. Plasmas).

S. Barua, R. Ganesh and K. Avinash, A molecular dynamic study of phase transitions in strongly coupled pair plasma, 2015 (In print Phys. Plasmas)

K. Avinash, Theory of correlation effects in dusty plasmas, Phys Plasmas, **22**, 033701 (2015).

D. H. Gupta, P Yadav, D. Jang, Min Sup Hur, H. Suk and K. Avinash, *Phys. Plasmas* **22**, 052101 (2015)K.

Avinash, G. P. Zank, B. Dasgupta,, and Shikha Bhadoria, Instability of the heliopause driven by charge exchange interactions, *Ap.J.* 791:102, (2014).

K. Avinash and S. Choudhary, Stirling like Engine using plasma electric fields., *Proc. Indian National Science Academy*, 80, 1099 (2014).

S. K. Mishra. **K. Avinash** and P. K. Kaw, *J. Plasma Phys.* 10.1017 (2014).

K. Avinash and P. K. Kaw, Plasma heating by electric field compression, *Phys. Rev. Lett.* **112**, 185002 (2014).

K. Avinash, G. P. Zank,, B. Dasgupta,, and Shikha Bhadoria, Instability of the heliopause driven by charge exchange interactions, *Ap.J.* 791:102, (2014)

K. Avinash, Dust clusters in complex plasmas, International conference on complex processes in plasmas and non linear dynamical systems, AIP Conference Proceeding 2014, vol. 1582, pp 66.

R. Fisher, K. Avinash, E. Thomas, R.L.Merlino, and V. Gupta, Dust thermal energy density: theory and experiments, *Phys Rev E* **88**, 031101(R) (2013)

D. N. Gupta, K. Avinash, and H. Suk, Transient self-focusing of an intense laser pulse in magnetized plasmas under non-paraxial approximation. To appear in *Particle and Beams* (2013).

P. K. Shukla and K. Avinash, Theory of phase separation in ultra cold neutral plasmas, *Plasma Phys. Control. Fusion* **54** (2012) 124030.

V. Saxena, K. Avinash, and A. Sen, Dust cluster explosion, *Phys. Plasmas* **19**, 093706 (2012)

K. Avinash, P. K. Shukla, and R.L.Merlino, 2012 Effect of an external magnetic field on a critical point for phase transitions in ultra cold neutral plasmas. *Physica Scripta* (in Print).

P. K. Shukla and K. Avinash, Phase transitions in quantum plasmas, *Phys. Lett. A*, 376, 1352 (2012).

K, Avinash, P K Shukla and R L Merlino. 2011. Anomalous dust temperature in dusty plasma experiments. *Phys. Lett. A*. 375: 2854.

Shukla, P K and Avinash K . 2011. Phase co existence and a critical point in ultra cold neutral plasmas. *Phys. Rev. Lett.* 107: 135002.

K, Avinash. 2010. Thermodynamics of the inter-conversion of heat and work via plasma electric fields. *Physics of Plasma*. 17: 123170.

K, Avinash. 2010. Plasma heat pump and heat engine. *Phys. Plasmas*. 17: 082105.

Slavin, J D, P C Frisch, J Heerikhuisen, N V Pogorelov, H R Mueller, W T Reach, G P Zank, B Dasgupta and Avinash K. 2010. Exclusion of Tiny Interstellar Dust Grains From the Heliosphere. *arXiv:0911.1492v1*.

K, Avinash and P K Shukla. 2010. Avinash-Shukla mass limit for the maximum dust mass supported against gravity by electric Fields. *J. Plasma Phys.* 76 : 493.

K, Avinash, S M Cox, D Shaikh and G P Zank. 2009. Four-Fluid Model and Numerical Simulations of Magnetic Structures in the Heliosheath. *Ap. J.* 695(1) : 420-430.

K, Avinash, S A Khrapak and G Morfill. 2009. Critical Point and Sound waves in complex plasma. *Phys. Plasmas*. 16: 073706.

B, Eliasson, Avinash K and P K Shukla. 2008. Dynamics of self-gravitating dust clouds in astrophysical plasmas. *AIP Conf. Proc.* 1041: 109-112.

V, Nosenko, R Fisher, R Merlino, S Khrapak, G Morfill and Avinash K. 2007. Measurement of the ion drag force in a collisionless plasma with strong ion-grain coupling. *Phys. Plasmas*. 14 : 103702.K, Avinash. 2007. An energy principle for charged dust clouds. *Phys. Plasmas*. 14: 093701.

Ng, C S, A Bhattacharjee, S Hu, Z W Ma and Avinash K. 2007. Generalization of Nonlinear fluid model for void formation in dusty plasmas. *Plasma physics and controlled fusion*. 49: 1583-1597.

K, Avinash and G P Zank. 2007. Micro propulsion in space via dust-plasma thruster. *Phys. Plasmas*. 14: 053507.

K, Avinash and G P Zank. 2007. Magnetic structures in Heliosheath. *Geophysical Research Letter*. 34: L05106

.K, Avinash. 2007. Theory of charges dust clouds: Equilibrium. *Phys. Plasmas*. 14: 012904

K, Avinash. 2007. A mean field theory of critical phenomenon for mutual repelling particles in complex plasmas. *Phys. Rev. Lett.* 98: 095003.

Sokolov, V, X, Wei, A K Sen and Avinash K. 2006. A basic study of Zonal flows. *Plasma Physics and Controlled fusion*. 48: S111.K, Avinash, B Eliasson and P K Shukla . 2006. Dynamics of self gravitating dust clouds and the formation of Planetesimals. *Phys. Letts A*. 353: 105.

K, Avinash and P K Shukla. 2006. Gravitational equilibrium and Mass-limit for dust clouds. *New Journal of Physics*. 8: 2.

K, Avinash. 2006. Equation of state for electrostatic pressure in dusty plasmas. *Phys. Plasmas*. 13: 012109.

Srinivasan, R and Avinash K . 2005. Reverse shear bifurcations in Tokamaks. *Phys. Plasmas*. 23: 2345.

Liu, B, Avinash K and J Goree. 2004. Sheath Diagnostic using particles in dusty plasmas. *Phys. Rev E*. 69: 036410.

K, Avinash. 2004. Theory of second harmonic generation in Plasma Crystals. *Phys. Plasmas*. 11: 1891.

Nosenko, V, Avinash K, J Goree and B Liu. 2004. Nonlinear interaction of compressional waves in 2D plasma crystal. *Phys. Rev. Lett.* 92: 085001.

Thomas, E, Avinash K and R L Merlino. 2004. Probe induced voids in dusty plasmas. *Phys. Plasmas*. 11: 1770.

K, Avinash, A Bhattarjee, R Merlino. 2003. Effect of charge reduction on shielding in dusty plasmas. *Physics of Plasmas*. 10: 2663.

Ghosh, S, S Sarkar, M Khan, Avinash K and M R Gupta. 2003. Dust acoustic shock wave at high dust density. *Phys. Plasmas*. 10: 977.

K, Avinash, P Zhu, V Nosenko and J Goree. 2003. Nonlinear Compressional Pulses in a two Dimensional plasma Crystal. *Phys. Rev E*. 68: 46402.

K, Avinash, A Bhattacharjee and S Hu. 2003. A Nonlinear Theory of Void Formation in Colloidal Plasmas. *Phys.Rev.Lett.* 90: 075001-1.

Liu, Bin, Avinash K and J. Goree. 2003. Transverse optical mode in a one dimensional Yukawa chain. *Phys. Rev. Lett.* 91: 255003.

Dahiya, R P, Avinash K and A Bhattacharjee. 2002. Evolution and dynamics of dust voids in Complex plasmas. *Phys.Rev.Lett.* 89: 125001.

K, Avinash, A Bhattacharjee and S Hu. 2002. Acoustic modes in dense dusty plasmas. *Phys.Plasma*. 9: 4118.

R, Ganesh and Avinash K. 2002. Statistical Mechanics of Axisymmetric Vortex Rings. *Phys. Rev*

E. 65: 026402.

Ghosh, S, Avinash K, et al. 2002. Non-linear Acoustic modes at high dust density. *Phys. Lett. A.* 49: 298 .

Nosenko, V, Avinash K, J Goree and B Liu. 2002. Nonlinear Compressional Waves in a 2-D Plasma Crystals: Experiment. [FP1-103] *Bull.APS.* 47: 121.

B, Liu, Avinash K, J Goree and V Nosenko. 2002. Nonlinear Compressional Waves in a 2-D Plasma Crystals: Simulation. [FP1-104] *Bull.APS.* 47: 121.

Merlino, R L, E Thomas, Avinash K and A Bhattacharjee. 2002. Probes induced voids in a dusty Plasmas. [FP1-109] *Bull.APS.* 47: 123.

K, Avinash, J Goree, B Liu and V Nosenko. 2002. Nonlinear Compressional Waves in a 2-D Plasma Crystals: Theory. [FP1-102] *Bull.APS.* 47: 121.

Nunomura, S, J Goree, S Hu, X Wang, A Bhattacharejee and Avinash K. 2002. Phonon Spectrum In Plasma Crystals. *Phys. Rev. Lett.* 89: 035001.

Sen, A K, V Reva and Avinash K. 2001. A hybrid ion temperature gradient and Kelvin-Henoltz instability. *Phys. Plasmas.* 8(11): 4772.

Srinivasan, R, Avinash K and P K Kaw. 2001. High beta compact toroidal Equilibria. *Phys. Plasmas.* 8(10): 4483.

K, Avinash and Ganesh R. 2001. Phase-Transitions in Euler fluids. *Phys. Rev. E.* 64: 046305.

Dong, J Q, Y X Long and Avinash K. 2001. Magnetic and Velocity shear effects on Ni-modes in plasmas with ion temperature anisotropy. *Phys. Plasmas.* 8(9): 4120.

K, Avinash. 2001. Propagation of Dust electroacoustic modes in Dusty plasmas. *Phys. Plasmas.* 8(9): 3897.

K, Avinash. 2001. Voids and Phase separation in complex plasmas. *Phys. Plasmas.* 8: 2601.

K, Avinash and P K Shukla. 2001. Electro Acoustic effects in Dusty Plasmas : The Dust electroacoustic mode . *Physico Sci.* T89: 154.

K, Avinash. 2001. Ionisation instability in Dusty plasmas with charging dynamics. *Phys. Plasmas.* 8(1): 351.

R, Ganesh and Avinash K. 2000. Coherent structures in screened 2-d turbulences. *Phys. Plasmas.* 7(10): 3947.

K, Avinash and P H Diamond. 2000. Active control of Edge Localised Modes by RF waves. *Phys. Plasmas.* 7(11): 4616.

K, Avinash and P K Shukla. 2000. A new acoustic like mode in unmagnetised dusty plasmas. *Phys. Plasmas.* 7(10) : 2763.

Srinivasan, R and Avinash K. 2000. Poloidal flows and ERS bifurcation in Tokamaks. *Phys. Plasmas.* 7(5): 1437.

Avinash, K and V L Rvachev. 2000. Non-Archimedean Algebra: Applications to Cosmology and Gravitation. *Foundations of Physics.* 30 : 139.

R, Ganesh and Avinash K. 2000. Negative temperature transitions in an ensemble of charged rings. *Phys. Lett A.* 97: 265.

#### Conference Presentations Invited talks

(1) "Saw tooth oscillations in Tokamak" by K.Aviash, International Conference on Plasma Physics, New Delhi, 1989. Reprinted in {\bf A Variety o Plasmas} Ed. A.Sen & P.K.Kaw.

(2) National symposium on plasma science and technology 1994 Guwahati " Internal disruptions in tokamaks"

- (3) National symposium on plasma science and technology 1996 Bhopal “ Enhanced reverse shear modes in Tokamaks”
- (4) “Vapor-liquid phase transitions in Dusty Plasmas” by K. Avinash, IInd International Conference in Dusty Plasmas. May 24-29, 1999, Hakone, Japan.
- (5) “Low Frequency Acoustic Modes in Dusty Plasmas” by K. Avinash, International Conference in Dusty Plasmas. July 3-8, 2000, International Centre of Theoretical Physics, Trieste, Italy.
- (6) Tata Institute of Fundamental Research Silver Jubilee colloquium Invited speaker (1997) “Self Consistent galactic Dynamos”.
- (7) “Gravitational equilibrium mass limit of dust clouds” Autumn school in Plasma Physics International Centre for Theoretical Physics Trieste Italy 5<sup>th</sup> Sept – 30<sup>th</sup> Sept. 2005.
- (8) “Gravitational Collapse in dust clouds”, 21<sup>st</sup> National Symposium on Plasma science and Technology, Jaipur 19-22 December 2006.
- (9) “ Magnetic structures in heliosheath” 2008 Huntsville Workshop: The Physical Processes for energy and Plasma transport across Magnetic Boundaries, 26-31 October 2008, Huntsville AL USA.
- (10) “Four fluid model and simulations of magnetic structures in the heliosheath” Voyager in heliosheath: Observations, models, and plasma physics, 9-14 January, 2009, Sheraton Kauai, Hawaii USA.
- (11) “Nonlinear wave structures in the heliosheath” UAH Workshop on “Partially Ionized Plasmas throughout the Cosmos” October 3-8, 2010, Nashville USA.
- (12) “Pulsed Dust thrusters for micro-propulsion” National Conference on Electric Propulsion Systems, LPSC, February 23-24, 2011, Bangalore India.
- (13) “Plasma heat pump” International Conference on Physics of dusty plasmas (ICPDP 2011) May 16-20, 2011, Garmisch Partenkirchen Germany.
- (14) “Rayleigh Taylor instability of the heliopause in the neighborhood of the stagnation point” 5-9 December 2011 Fall Meeting of American Geophysical Union, San, Francisco USA.
- (15) Invited talk EPS/ICPP “Theory of phase separation in ultra-cold neutral plasma” Stockholm, 2-8 July 2012 Sweden
- (16) Invited talk at 54th American Physical Society Division of plasma physics annual Meeting

“Dust cluster explosion” October 29-November 2, 2012 in Providence, Rhode Island, USA.

(17) keynote talk in 7<sup>th</sup> International Conference on the Physics of Dusty Plasmas (ICPDP 2014) 3-7 March 2014, New Delhi India “Thermodynamics of dusty plasmas”.

(18) Invited talk Midyear meeting Indian Academy of Sciences Bangalore 2-4 July 2015

+Equilibrium and mass limit of dust cloud”

(19) Invited talk 18<sup>th</sup> International Congress on Plasma Physics, ICPP 2016 Kaohsiung, Taiwan 29<sup>th</sup> June-1<sup>st</sup> July 2016 “Thermodynamics of Dusty plasmas”.

Total Publication Profile optional

Journal publications (refereed 157)

high impact factor publications Physical Review letter, Ap.J 16.

Total no citations > 3000.

Maximum citations of a paper 140.

H Index = 30

Public Service / University Service / Consulting Activity

(1) Referee for Physics of Plasmas, Physical Review A, Journal of Plasma physics

(2) Member, Editorial Board, Indian Journal of Physics, A & B (1998-2002).

(3) Organized “Visitors Program 2006”, “Visitors Program 2007 and “Visitors Program 2008”.



(4) Organized UGC-ASC Refresher Course in Physics and Electronics at Department of Physics and Astrophysics University of Delhi, 9-31 March 2007.

(5) Organized International National conference on physics of dusty plasma 3-7 March New Delhi 2014.

(6) Convener of committee of various committee from time to time in the Department of Physics, Delhi Univ.

(7) Member of Governing council of several collages of Delhi University.

#### Professional Societies Memberships

(1) Member, American Physical Society.

(2) Life member Plasma Science Society of India.

(3) Member, Indian National Science Academy

(4) Member, American Geophysical Union.

(5) Member, National Academy of Sciences, Allahabad

(6) Member, Indian Academy of Sciences, Bangalore

#### Hobbies

Music: Western Classical, Indian Classical, film music (old and new), folk,  
Sports: Football, Karate (3 years training), Long distance running, finished half Delhi  
marathon (21 km) 2006.  
Film appreciation