

Curriculum Vitae - Prof. A.K. Jain



Prof. A.K. Jain is a Professor of Physics at I.I.T. Roorkee, where he has been teaching and doing research since 1979. Prof. A.K. Jain obtained his education right from the school to Ph.D. from the number one rated university of India, the Banaras Hindu University. After a brief period of Post-Doc at BHU, he joined the University of Roorkee, now the Indian Institute of Technology Roorkee, as a Lecturer in 1979. He was designated as the Head of the Department in Jan. 2011.

He has also visited and worked at the Florida State University, McMaster University, Kuwait University and Yangon University as a Research Associate/Visiting Professor. Besides he has visited a number of other labs and universities abroad for short visits. Dr. Jain has been at the forefront of Nuclear Structure Physics in India for the last 32 years, having contributed to a variety of areas and topics.

He has published two authentic articles in the prestigious journal of the *Reviews of Modern Physics* which has an impact factor in the range of 30-40. He is known for his simple approaches and the focus on basic underlying physics in complex problems. He is an excellent teacher and speaker having delivered dozens of lectures and lecture series in various workshops, conferences, and schools.

He has the natural leadership qualities and can handle complex issues with great ease. Having been educated at BHU, he understands the institution very well. Also, he was deeply involved in the conversion of University of Roorkee to the IIT Roorkee in 2001. He has the unique experience of this transition and the working of a university and an IIT system.

Prof. Jain also has a deep interest in the philosophical and spiritual aspects of various religions with a focus on the Jain religion. His father, Late Sidhantacharya Pandit Phool Chandra Shastri, a veteran freedom-fighter, social activist and pre-independence Congress worker, was a renowned scholar of Jainism, Sanskrit and Prakrit. Prof. Jain carries forward his father's legacy.

Date of Birth: 20th April 1950

Nationality: Indian

Address:

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Education & Qualifications:

1972-1977

Banaras Hindu University

Ph.D.(Physics)

Topic: *Description of High Spin Features of Yrast Bands in Deformed Nuclei*

1970-1972

Banaras Hindu University

M.Sc. (Physics), *First Div.*

1967-1970

Banaras Hindu University

B.Sc. (Physics), *First Div.*

Distinction in Mathematics

1966-67

Banaras Hindu University

P.U.C., *First Div.*

Distinction in Mathematics

1965-1966

Children's School, B.H.U.

Admission Examination, (High School), *First Div.*

Distinction in Mathematics

WORK:**Areas of Professional Experience:**

Theoretical Nuclear Physics: Nuclear Structure Physics.

Also guided Ph.D.'s in Experimental Nuclear Physics in recent years.

Teaching Experience:

1. Post graduate and under-graduate teaching for the past 32 years.
2. Ph.D. Thesis guided (8), in progress (4).
3. M.Phil. Thesis guided (2).
4. M.Sc. projects guided (more than 50).

Courses taught:

Advanced Nuclear Physics,	Elementary Nuclear Physics
Physics for Engineers (Ph-101,102),	Classical Mechanics
Quantum Physics,	Advanced Quantum Mechanics
Angular Momentum Algebra,	Group Theory
Computer Simulation ,	Nuclear Physics and its applications

Employment Record:

S.No.	Employer	Position	Period
1.	I.I.T. Roorkee	Professor	June 2001- present
2.	-do-	Professor & Head	Jan. 2011 – present
3.	University of Roorkee	Associate Professor	April 1996-May 2001
4.	-do-	Reader	Aug 1994- March 1996
5.	-do-	Lecturer (Sr.)	Sept 1992-July 1994
6.	-do-	Lecturer	Sept 1979- Aug 1992
7.	B.H.U.	P.D.F.	Jan 1978-Aug 1979
8.	Brookhaven Natl. Lab	Visiting Scientist	July-Aug, 1986
9.	Florida State University	Research Associate	Aug 1987-July 1988
10.	Florida State University	Research Associate	June 1989-Aug 1989
11.	McMaster University	Visiting Scientist	June 1997-Aug 1997
12.	McMaster University	Visiting Professor	May 2004-June 2004
13.	McMaster University	Visiting Professor	June 2005
14.	Kuwait University	Invited Visiting Professor	Academic Year 2005-06
15.	Kuwait University	Visiting Scientist	March 2007
16.	Yangon Univ, Myanmar	Visiting Professor	July-Aug 2005
17.	IST, Lisbon, Portugal	Visiting Professor	June 2007
18.	NNDC, Brookhaven National Laboratory	Visiting Scientist	June 2008

Recognized by IIT, Roorkee as a “**Star Performer**” in teaching and research in 2004.

Research Projects:

1. **P.I.**, Study of Complex Band Spectra in Deformed Nuclei, D.A.E., 1986-1989.
2. **P.I.**, Study of one and many-quasiparticle states, D.A.E., 1990-1994.
3. **P.I.**, Multifaceted Study of the Deformed Nuclei, D.S.T., 1996-2001.
4. **P.I.**, Nuclear Structure of Some Rare Nuclear Phenomena, D.S.T., 2000-2004.
5. **Co- P.I.**, Semi-classical Methods in Nuclear Physics, D.A.E., 1999-2003.
6. **P.I.**, Improved decay data for tuning and testing of nuclear structure models, I.A.E.A, 2003-2007.
7. **Co-Investigator**, National Project on Indian National Gamma Array (INGA), D.S.T., 2005-2009 sanctioned at IUAC, New Delhi.
8. **P.I.**, Nuclear Structure Studies of Multi-Quasiparticle States and Nuclear Isomers, D.S.T., 2010-2013.
9. **P.I.**, Improved Nuclear Structure and Decay Data for Nuclear Models in the Heavy Nuclides Region, BRNS-DAE, 2011-2014.

(DAE- Dept. of Atomic Energy, **DST**-Dept. of Science & Technology, Govt. of India,
IAEA- International Atomic Energy Agency)

Other Professional Activities:

1. **Coordinator, Nuclear Data Center** at the Indian Institute of Technology, Roorkee, under the auspices of the *International Atomic Energy Agency, Vienna*. This is a part of the International Network of Nuclear Structure and Decay Data Evaluators.
<http://www-nds.iaea.org/nsdd/>
2. **Present Research Collaborations:**
National - IUAC, New Delhi; T.I.F.R. Mumbai; B.A.R.C., Mumbai; Delhi University; G.N.D. University; B.H.U.
International - McMaster University; Centro de Física das Interações Fundamentais (CFIF), Departamento de Física, Instituto Superior Técnico (IST), Lisbon.

Symposia/Workshops Organized:

1. **Convener**, Second National Workshop on Nuclear Structure Physics, Roorkee, 7-10 Feb. 1995.
2. **Convener**, National Workshop on Nuclear Structure and Dynamics, Roorkee, 21-23 Aug. 1999.
3. **Coordinator**, Orientation Program on Exotic Decays and Shell Model, 21 Dec. 2008.
4. **Local Convener**, DAE Symposium on Nuclear Physics, Roorkee, 22-26 Dec. 2008.
5. **Chairman**, School cum Workshop on Nuclear Yrast and Near-Yrast spectroscopy, I.I.T., Roorkee, 26-30 October 2009.
6. **Convener**, Interaction meeting on “Theoretical Nuclear Physics”, D.S.T., held at IIT Roorkee, September 3-5, 2010.
7. **Chairman**, Planning Committee meeting on SERC Schools in Nuclear Physics, held at IIT Roorkee, March 17, 2011.
8. **Director**, S.E.R.C. (D.S.T.) School on Modern Trends in Nuclear Structure and Dynamics, held at IIT Roorkee, Feb. 6-24, 2012.
9. **Chairman**, National Conference on Advances in Physics, Feb. 25-26, 2012, held at IIT Roorkee.
10. **Chairman**, Golden Jubilee Alumni meet & Mini Workshop, 31 March, 2012, held at Physics Department, IIT Roorkee.
11. **Co-Chair**, International Conference on Recent Trends in Nuclear Physics, November 19-21, 2012, held at Chitkara University, Solan (H.P.).

Recent Administrative duties/assignments at IIT Roorkee:

1. **Head**, Department of Physics, IIT Roorkee, since Jan 2011.
2. **Convener**, Standing Committee on Radiological Materials, since 2010.
3. **Convener**, Institute Lecture Series, IIT Roorkee, since 2010.
4. **Member**, Group Purchase Committee, SRIC, since 2009.
5. **Member**, Educational Planning and Research Committee, IITR.
6. **Chairman**, Department Research Committee, 2008-April 2010.
7. **Member**, Institute Library Advisory Committee, IITR, 2008-2010.
8. **Member**, Institute Lecture Series, IITR, 2006-2009.
9. **Chairman**, Department Purchase, Finance & Store Committee, 2005-2008.
10. **Member**, Strategic Planning Group, IIT Roorkee, 2002-2006.

Professional Society Membership:

1. Life Member, Indian Physics Association.
2. Life Member, Indian Science Congress Association
3. Life Member, Indian Association of Physics Teachers

Doctoral Student Thesis Direction:

1. **K. Jain**, 1987, New features in rotational bands of odd-A nuclei.
2. **A. Goel**, 1992, Study of 2qp band structures in odd-odd and even-even nuclei.
3. **M. Dudeja**, 1998, Application of Semiclassical Methods to Deformed and Superdeformed Nuclei.
4. **A. Rastogi**, 2001, Shears Mechanism in Magnetic Rotational Bands.
5. **Priyanka Agarwal**, 2007, Magnetic Rotation in Nuclei of A=80 and A=130 Mass Region
6. **Suresh Kumar**, 2008, Study of Shape Effects and Magnetic Rotation in N=79 and 47 Nuclei
7. **Sukhjeet Singh**, 2008, High Spin Features of Odd-A Nuclei using 3QP plus Rotor Model
8. **Deepika Choudhury**, 2012, Study of new coupling schemes in nuclei in A=110 and 135 mass regions.
9. **Monika Patial**, joined in 2009, Theoretical & Experimental Studies in Nuclear Isomers
10. **Pooja Devi**, joined in 2009, Study of air-moisture dynamics at local and regional scale using Isotope techniques
11. **Bhoomika Maheshwari**, joined in 2011
12. **Neha Sharma**, joined in 2010

Master's Student Thesis Direction:

M.Phil:

1. **R. Agrawal**, 1992, Compton Scattering X-section of gamma-rays.
2. **P. Verma**, 1999, Computer Simulation of Physics Problems.

M.Sc.– More than 50.

Awards, Honors and Recognitions in last 10 years:

1. Member, Cyclotron Users Committee, Variable Energy Cyclotron Centre (DAE), Kolkata, since 2013.
2. Patron, Indian Association of Physics Teachers, Regional Chapter, Uttarakhand, 2013.
3. Member, International Advisory Committee, ND2013 - International Conference on Nuclear Data for Science & Technology, NNDC, Brookhaven Natl. Lab, USA.
4. Member, National Advisory Committee, D.A.E. Symposium on Nuclear Physics, 2012, 2013.
5. Member, Board of Studies, Thapar University, Patiala, 2013.
6. Member, Program Review Committee, Nuclear Data Physics Centre of India, BRNS-DAE, Mumbai, 2012-continue.
7. Chairman, Planning Committee of SERC (DST) Schools in Nuclear Physics and Nuclear Theory since 2010.
8. Mentor, INSPIRE program, DST, Govt. Of India, since 2010.
9. Chairman, Steering Committee for the proposal on Centre for Nuclear Theory, 2010.
10. Member, Management Advisory Committees for Major Research Projects (DST) at IUAC, New Delhi.
11. Member, Governing Body, L.M.S. PG (Autonomous) College, Rishikesh, 2010-2012.
12. Member, Advisory Committee, Nucleus-Nucleus Collision around Fermi energies, VECC, Kolkata, 16-17 Dec. 2010.
13. Member, Program Advisory Committee, (Plasma, High Energy, etc.), D.S.T., 2004-2007.
14. Member, Planning Committee on SERC Schools in Nuclear Physics, since 2005.
15. Member, International Network of Nuclear Structure Decay Data Evaluators (IAEA, Vienna), since 2004.
16. Member, Management Advisory Committee for major development projects of DST at IUAC, New Delhi, 2006.
17. Awarded by IIT, Roorkee as **“Star Performer”** in teaching and research, 2004.
18. D.A.E. Golden Jubilee Lecture at Institute of Physics, Bhubaneswar, March, 2004.
19. Member, D.S.T. Review Committee for Nuclear Science Centre, New Delhi, 2004.
20. Invited Lecturer at S.E.R.C Schools in Nuclear Physics (D.S.T.), held at Puri, **1996**; Chandigarh, **2002**; Mumbai, **2004**; and New Delhi, **2008**.
21. Associate, Nuclear Science Centre, New Delhi, 2005-2008.
22. Observer, International Committee of Nuclear Structure and Decay Data Evaluators, I.A.E.A., Vienna, 2003, and 2004.
23. Member, Dept. of Science & Technology (Govt. of India), Expert Committee to evaluate major nuclear physics proposals, 1998-2003.
24. Member, International Working Group of Physics and Astronomy, SSQ Project, Univ. of California, Berkeley, USA, 2000-2003.
25. Elected Member, Senate, Univ. of Roorkee, 1999-2002.
26. Convener, Theoretical Physics Seminar Circuit (DST), Roorkee Centre, 2000-2002; 2007-2010.

27. Theoretical Physics Seminar Circuit Speaker, 1994-95, 1998-2000 and 2004-2006, awarded under Dept. of Science and Technology.
28. Associate Member, Scientific Advisory Committee, Nuclear Science Centre, New Delhi.
29. Chairman, Accelerator User's Committee, Nuclear Science Centre, New Delhi, 2000-2002.
30. Member, Governing Board and Governing Council, Nuclear Science Centre, New Delhi, 2000-2002.

Recent Conferences/Workshops (last 10 years):

1. Conference on Particle Accelerators: Technology & Applications, IUAC, New Delhi, 4-5 April, 2013.
2. International conference on Nuclear Data "ND2013" in Brookhaven National Laboratory, Upton, New York, USA during 4-8 March, 2013.
3. 20th meeting of International Network of Nuclear Structure and Decay Data Evaluators, from 27–31 January, 2013, in KFAS, Kuwait
4. DAE Symposium on Nuclear Physics, Delhi University, 3-7 Dec., 2012.
5. Workshop on Evaluation of Nuclear Structure and Decay Data to be held at Variable Energy Cyclotron Centre, Kolkata from 26-29 November, 2012
6. International conference "Nuclear Structure 2012", USA, 13 -17 August, 2012.
7. Workshop on "Frontiers in Gamma Ray Spectroscopy", IUAC, New Delhi, 6-8 March, 2012.
8. QIP Workshop on "Perspectives on Research Methodology: Papers & dissertation", Department of HSS, IIT Roorkee, 13-14 Jan., 2012.
9. DAE Symposium on Nuclear Physics, Andhra Univ., Visakhapatnam, 26-30 Dec., 2011.
10. ANUP Workshop and School, Goa, 7-18 Nov., 2011.
11. Workshop on "Advances in Physics and Role of Experiments in Physics Teaching", Gurukula Kangri Vishwavidyalaya, Haridwar, 05 Nov., 2011.
12. Workshop on "Frontiers of Nuclear Data Physics and Related Applications", Jeddah, Saudi Arabia, 10-12 Sept., 2011.
13. International Network of Nuclear Structure and Decay Data Evaluators Meeting, I.A.E.A., Vienna, 4-8 April, 2011.
14. Nuclear Physics Symposium (D.A.E.), B.I.T.S., Pilani, 20-24 Dec. 2010.
15. International Workshop on NN Interaction and the Many Body Problem, Nov. 18-27, 2010, T.I.F.R., Mumbai.
16. National Seminar on Contemporary Trends in Nuclear Physics, A.M.U., Aligarh, 20-21 October 2010.
17. INSPIRE Science Camp, HNB Garhwal University, Srinagar, UK, 3-4 Dec, 2010.
18. Workshop on "Physics with FAIR: Indian perspective", V.E.C.C., Kolkata, 8-9 March 2010.
19. International Nuclear Physics Symposium, B.A.R.C., Mumbai, 8-12 Dec. 2009.
20. INS National Seminar on "Nuclear Technology for Sustainable Development", Thapar University, Patiala, 10-11 Oct. 2009.
21. Specialists' Meeting on Advances in Scientific Databases in India, I.G.C.A.R., Kalpakkam, 10-11 August 2009.
22. International Network of Nuclear Structure and Decay Data Evaluators, I.A.E.A., Vienna, 22-27 March 2009.
23. Nuclear Physics Symposium (D.A.E.), I.I.T. Roorkee, 22-26 Dec. 2008.

24. Nuclear Physics Symposium (D.A.E.), at BARC, Mumbai, 8-12 Dec. 2003; at Varanasi, 8-12 Dec. 2004; at Baroda, 8-12 Dec. 2006.
25. International Conference on Proton Emitting Nuclei and related topics, Lisbon, June 17-23, 2007.
26. Nuclear Structure – 2008, Michigan State University, East Lansing, Michigan, 3-6 June 2008.
27. International Network of Nuclear Structure and Decay Data Evaluators, 10-14 Nov.2003, IAEA, Vienna; 6-10 June 2005, McMaster University, Canada; 11-15 June 2007, St. Petersburg, Russia; Vienna, 22-27 March 2009.
28. International Workshop on Nuclear Structure, Shimla, India, March 2005.
29. DAE-BRNS National Workshop on Nuclear Data for Reactor Technology and Fuel Cycle, 7-10 March 2005, B.A.R.C., Mumbai.
30. Workshop on Nuclear Structure and Decay Data, I.A.E.A., Vienna, 18-22 Nov. 2002; 10-14 Nov. 2003.
31. International Conference on Science and Beyond, N.I.A.S., Bangalore, 8-11 Jan. 2003.
32. Workshop on Nuclear Physics with Indian National Gamma Array, N.S.C., New Delhi, Sept. 16, 2003.
33. International Workshop on Nuclear Structure: Theory and Data Evaluations, I.C.T.P., Trieste, Nov. 17-28, 2003.
34. International Nuclear Physics Symposium, Mumbai, 2000.
35. Workshop on “Physics with Large gamma ray array coupled with recoil separator”, B.H.U. Varanasi, 27-30 Sept, 2001.
36. Inaugural Convention of International Forum on India's Heritage, Hotel Intercontinental, New Delhi, 18-19 Nov. 2001.
37. International Workshop of Working Group on Physics & Astronomy, Paris, 9-12 Jan. 2001.
38. International Conference on Accelerator based research in Basic and Applied Sciences, N.S.C., New Delhi, 25-27 Feb. 2001.
39. Nuclear Physics Symposium (D.A.E.), Tirunelveli, 26-30 Dec. 2002.

Recent Invited Talks and Lectures:

- **A. K. Jain**, Some recent results and future directions for nuclear structure studies in India, April 4-5, 2013. Conference on Particle Accelerators: Technology & Applications, IUAC, New Delhi, 4-5 April, 2013.
- **A. K. Jain**, Hundred years of Rutherford Scattering in Nuclear Physics, INSPIRE program, Thapar University, Patiala, March 31, 2013.
- **A. K. Jain**, Talk on “Conservation of Isospin in n-rich fission fragments”, International Conf on Nuclear Data for Science & Technology, New York, March 4-8, 2013.
- **A. K. Jain**, Talk on “Horizontal evaluation – Nuclear Isomers”, IAEA Meeting of NSDD evaluators, KFAS, Kuwait, Jan. 27-31, 2013.
- **A. K. Jain**, Invited talk on “Nuclear Theory for the experimentalists and evaluators”, BRNS Workshop on Nuclear Structure and Decay Data, VECC, Kolkata, Nov. 26-30, 2012.
- **A. K. Jain**, Invited talk on “Role of Isospin conservation in n-rich nuclei”, SCRIBE, VECC, Kolkata, Nov. 7-9, 2012.
- **A. K. Jain**, Hundred years of Rutherford Scattering in Nuclear Physics, INSPIRE program, HNB University, Srinagar Garhwal, Dec. 4, 2010.

- **A.K. Jain**, Conservation of Isospin in the Fission of Heavy Nuclei, International Workshop on NN Interaction and the Many Body Problem, Nov. 18-27, 2010, T.I.F.R., Mumbai.
- **A. K. Jain**, Atlas of Nuclear Isomers and their systematics, International Network of Nuclear Structure and Decay Data Evaluators, I.A.E.A., Vienna, April 4-8, 2011
- **A. K. Jain** – Invited Talk on “Semiclassical Approaches to Phenomena in Deformed Nuclei”, Workshop on “Frontiers in Gamma Ray Spectroscopy”, T.I.F.R., Mumbai, 2-4 March 2009.
- **A.K. Jain** – Invited Talk on “*Magnetic Rotation - Past, Present and Future*”, International Nuclear Physics Symposium, B.A.R.C., Mumbai, 8-12 Dec. 2009.
- **A. K. Jain** – Invited Lecture on “*Geometrical Symmetries and Level Structure*”, School cum Workshop on Nuclear Yrast and Near-yrast States, IIT, Roorkee, 26-30 Oct. 2009.
- **A. K. Jain** – Invited Talk on “*Some exotic phenomena in nuclei*”, INS national Seminar on “Nuclear Technology for Sustainable Development”, Thapar University, Patiala, Oct. 10-11, 2009.
- **A. K. Jain** – Invited Lecture on “*Particle Physics – Existence and Eternity*”, Course on Synergy through Self-Awareness and Personal mastery, National Academy of Direct Taxes, Nagpur, 14-16 Sept 2009.
- **A.K. Jain** – Lecture series on “Basic Properties of Nuclei” (a set of six lectures), SERC School on Nuclear Physics, IUAC, New Delhi, 1-20 September 2008.
- **A.K. Jain** – Lecture series on “Symmetries and Nuclear Spectra” (a set of six lectures), SERC School on Nuclear Physics, IUAC, New Delhi, 1-20 September 2008.
- **A.K. Jain** – Invited talk on “Recent Developments in Nuclear Structure Theory” at Seminar on “Recent Trends in Physics”, Panjab Univ, Chandigarh, Feb 29, 2008.
- **A.K. Jain** – Invited talk at the International Conference on Proton Emitting Nuclei and related topics, Lisbon, June 17-23, 2007.
- **A.K. Jain**, S.S. Malik and S.R. Jain, Invited Talk “*Semiclassical Route to Shell Model*”, International Workshop on “Nuclear Structure Physics at the Extreme; New Directions”, Shimla, India, 21-24 March 2005.
- **A.K. Jain** and Mohini Gupta, Invited talk “*ENSDF – Purpose, Philosophy and Usage*”, at DAE-BRNS National Workshop on Nuclear Data for Reactor Technology and Fuel Cycle, 7-10 March 2005, B.A.R.C., Mumbai.
- **A.K. Jain**, Invited lecture “*Magnetic Phenomena in Nuclei*”, in the D.A.E. Golden Jubilee Lecture Series at the Institute of Physics, Bhubaneswar, March 10, 2004.
- **A.K. Jain** and P. Arumugam, Lectures entitled “*Shell Structure, Cranking and Magnetic Phenomena in Nuclei*”, at S.E.R.C School in Nuclear Physics (Dept. of Science & Technology, Govt. of India), IIT, Mumbai, 2004

Summary of Scientific Contributions of Professor A. K. Jain

Professor Jain has made many significant and original contributions in several areas of Nuclear Structure Physics in general and Physics of Deformed and Nearly Deformed Nuclei in particular, a brief account of which is outlined below. Prof. Jain is considered as one of the top leaders in the field as evidenced by the citations and large number of invited talks and lectures delivered in national and international conferences/workshops/schools. He is a member of the International Network of Nuclear Structure Decay Data Evaluators (IAEA), and has also served on the advisory committees of a number of national and international conferences.

- 1. Identical Bands in Normal Deformed Nuclei:** Band structure of each nucleus is expected to be unique. It is, therefore, very unusual that two nuclei should display identical bands. Many examples of identical bands in odd-A deformed nuclei were discovered by the nominee for the first time in 1984 (*Z. Physik A317*, 2050, 1984; *Phys. Rev. C30*, 2050, 1984). It was followed up by him through his observations of identical band structures in groups of nuclei (*Z. Physik A320*, 645, 1985; *Modern Physics Letters A3*, 743, 1988) and explained in terms of multiplets of F-spin and SU(7) group. He showed many examples of this in the rare-earth region (*REVIEWS OF MODERN PHYSICS* 62, 393-509, 1990) and the actinide region (*At. Data & Nucl. Data Tables* 50, 269-342, 1992). Later on, this phenomenon became very well known in the context of super-deformed bands. This discovery has been credited to him in the review article on Identical bands (*Ann. Rev. Nucl. Part. Sci.* 45, 485, 1995) and also discussed at length in the lectures of R. F. Casten at XVIII Summer School on Nuclear Structure Studies at Mikolajki, Poland, 1986.
- 2. Nuclear Structure of ODD-A Deformed Nuclei:** The Nilsson model has played an important role in the understanding of the structure of deformed nuclei. He has made many contributions to the understanding of Odd-A nuclei by using this model. He has examined the single particle states in deformed nuclei and carried out a detailed comparison with the Nilsson model and its extension to octupole shapes. These contributions have been comprehensively covered in his article in the Reviews of Modern Physics (*REVIEWS OF MODERN PHYSICS* 62, 393-509, 1990). This article is now taken as a standard reference in the nuclear data evaluation (Nuclear Data Sheets, first issue of each volume).
- 3. Nuclear Structure of ODD-ODD Deformed Nuclei:** The band structure of odd-odd nuclei is much more complex than odd-A nuclei. One would expect a more regular rotational pattern in the odd-odd nuclei due to diminished pairing correlations. However, he discovered for the first time the existence of an odd-even staggering in the K^- rotational bands of odd-odd nuclei. He explained this phenomenon in terms of higher order Coriolis effects (*Phys. Lett. B209*, 19, 1988; *Phys. Rev. C40*, 432-444, 1989). Further, the phenomenon of Signature inversion in odd-odd nuclei was also explained by him in terms of higher order Coriolis effects (*Physics Letters B277*, 233-237, 1992 and *Nuclear Physics A620*, 265, 1997). These contributions of Prof. Jain and his coworkers culminated in the publication of the second review by the nominee in the prestigious Reviews of Modern Physics in 1998 (*REVIEWS OF MODERN PHYSICS* 70, 1998, 843-895). His two articles in Atomic and Nuclear data Tables in 1998 (*Atomic Data & Nuclear Data Tables*, 69, 239-348, 1998; 69, 239-348, 1998) cover all the data in the medium-heavy mass odd-odd nuclei along with the configuration assignments.

4. **Many-Quasiparticle States:** Prof. Jain's work on the odd-odd nuclei (which largely exhibit 2qp n-p states) was further extended to more complex states like two and three quasiparticle (2qp, 3qp) states and multi quasiparticle states in even-even and odd-A nuclei. He observed a new phenomenon of signature reversal in 2qp states of some even-even nuclei and also explained it in terms of higher order Coriolis effects (*Physics Letters B* 337, 240-244, 1994). The G-M rules applicable to odd-odd nuclei were generalized by him to three quasi-particle states and a model was proposed for the same (*Physical Review C* 45, 3013-3016, 1992; *Physical Review C* 75, 067301, 2007). Prof. Jain and coworkers have recently developed a model for the three-quasi-particle states (3qp plus rotor model) which is being used to understand the high spin features of the 3qp bands (*At. Data Nucl. Data Tables* 92, 1, 2006; *Phys. Scr. T* 125, 186, 2006).
5. **Superdeformed Bands:** Experimental observation of the high spin superdeformed (SD) bands was one of the most surprising discoveries in nuclear structure physics in the last decade of the 20th century. These bands display some very unusual properties like near rigid-rotor behaviour and total disconnectedness with normal level structures. Prof. Jain and coworkers have pointed out many new features of the SD bands like a weak oscillation in the gamma ray energies, and negative alignment (*J. Korean Phys. Sec. 29*, S361-S365, 1996; *Physics Letters B* 412, 14-18, 1997).
6. **Semi-classical Methods in Nuclear Structure Physics:** Prof. Jain and coworkers have successfully used the semi-classical methods in high spin phenomena like SD bands. A semi-classical analysis of the conventional models such as the Particle-Rotor model and the Cranking model has been carried out and several new features have been pointed out (*Phys. Lett. B* 392, 243-248, 1997; *Phys. Lett. B* 370, 1, 1996). In particular, a large starting spin for the band-head of the SD bands, weak oscillations and no linking transitions to normal states were shown to be closely related to the non-linearity of the model Hamiltonian and the ensuing second order phase transition (*Int. J. Mod. Phys. E* 9, 487-506, 2000). Prof. Jain and coworkers have also used the new and powerful technique of the Periodic Orbit Theory (POT) to understand the dynamics of deformed nuclei. A complete periodic orbit theory of deformed systems has been worked out and the role of three dimensional periodic orbits has been emphasized in the context of SD bands (*Int. J. Mod. Phys. E* 11, 1-17, 2002).
7. **Magnetic Rotation:** It was a big surprise when well developed rotational bands were seen in many Pb isotopes which are nearly spherical in nature. The levels of the bands were strongly linked by magnetic transitions rather than electric transitions. It has now been recognized that this rotation is not of the charge density as in deformed nuclei but is rather of currents (a magnetic top). Prof. Jain and coworkers have completed a survey of this area and identified as many as 178 candidates for the magnetic rotation (MR) bands all across the chart of nuclides (*Atomic Data & Nuclear Data Tables*, 74, 283-331 (2000); <http://www.nndc.bnl.gov/publications/preprints/mag-dip-rot-bands.pdf>, 2007). They have used the particle-rotor model as well as the self-consistent Tilted Axis Cranking model in pursuing a theoretical understanding of this phenomenon. He has also started an experimental program in this area and *has been successful in discovering many new MR bands along with new features like shape mixing, and crossing of two magnetic bands* (*Nucl. Phys.* A732, 13 (2004); *Nucl. Phys.* A761, 1-21 (2005); *Phys. Rev. C* 69, 014319 (2004); *Phys. Rev. C* 66, 041303 (*Rapid Comm.*), 2004).

8. **Anti-magnetic Rotation (AMR) bands in odd-A nuclei:** In analogy to anti-ferromagnetism in solids, Frauendorf proposed an arrangement of the proton and neutron spins so that the two pair of nucleons form a back to back shears with almost zero magnetic moment. The configuration is symmetric for rotation by 180 about the total angular momentum leading to a rotational band differing in spin by 2 units of spin. He discovered *the first example of this phenomenon, called anti-magnetic rotation (AMR), in an odd-A nucleus, ^{105}Cd* (Phys. Rev. C82, 061308, Rapid Comm, 2010). Following this further, he has recently reported *the first example of multiple AMR bands in ^{107}Cd* (Phys. Rev. C87, 034304, 2013). These discoveries have opened the possibility of more such bands in odd-A nuclei.
9. **Nuclear Isomers:** Prof. Jain has initiated a **new program of research in nuclear isomers** across the nuclear chart, particularly focused on the medium-heavy and heavy mass nuclei. A model is being devised to predict the existence of nuclear isomers in the non-yrast and far from the stability region. It is expected that the study will lead to a capability of making reliable predictions of isomers. One can then look for isomers which can have useful practical applications.

CITATION INDEX OF SOME PUBLICATIONS OF Prof. A.K. Jain

1. **Single-Particle States of Odd-A Deformed Nuclei in the Region($151 \leq A \leq 195$) and ($A \geq 221$)**
A.K. Jain, R.K. Sheline, P.C. Sood and Kiran Jain
REVIEWS OF MODERN PHYSICS 62, 1990, 393-509 (Cited: 185)
Impact factor of RMP: 32.7
2. **Nuclear Structure in Odd-Odd Nuclei, $144 \leq A \leq 194$**
A.K. Jain et al.
REVIEWS OF MODERN PHYSICS 70, 1998, 843-895 (Cited: 62)
Impact factor of RMP: 32.7
3. **Table of Magnetic Dipole Rotational Bands**
Amita Rastogi, A.K. Jain and B. Singh
Atomic Data and Nuclear Data Tables 74, 2000, 283-331 (Cited: 43)
Impact factor of ADNDT: 2. 79
4. **Shape Transition and Tilted Axis Rotation in ^{136}Ce**
S. Lakshmi, H.C. Jain, P.K. Joshi, Amita, Priyanka Agarwal, A.K. Jain and S.S. Malik
Physical Review C66, 2002, 041303 (Rapid Comm) (Cited: 18)
Impact factor of PRC: ~3
5. **Nonlinear Dynamics of High-j Cranking Model: A Semiclassical Approach**
Sudhir R. Jain, Ashok K. Jain and Zafar Ahmed
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Impact factor of PLB: ~3.5
6. **Mechanism of Signature Inversion In Odd-odd Rotational Bands**
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Impact factor of PLB: ~3.5
7. **An Empirical Model for Three-Quasiparticle states**
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8. **Coriolis Coupling in the Rotational Bands of Deformed Odd-odd Nuclei**
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Impact factor of PRC: ~3
9. **Reflection Assymmetric and Symmetric Shapes in ^{225}Ra ; Polarisation Effect of Odd Particles**
R.K. Sheline, A.K. Jain, Kiran Jain and I. Ragnarsson
Physics Letters B219, 1989, 47-51 (Cited: 14)
Impact factor of PLB: ~3.5
10. **Odd-Even Staggering in the $K=1, 2, 3$ and 4 Rotational Bands of Deformed Odd-Odd Nuclei**
A.K. Jain, J. Kvasil, R.K. Sheline and R.W. Hoff
Physics Letters B209, 1988, 19-22 (Cited: 18)
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11. **Possible Octupole Deformation in Cs and Ba Nuclei from their Differential Radii**
R.K. Sheline, A.K. Jain and Kiran Jain
Physical Review C38, 1988, 2952-2954 (Cited: 24)
12. **Evidence of Anti-magnetic Rotation in Odd-A ^{105}Cd**
D. Choudhury, A.K. Jain et al.
Phys. Rev. C82, 2010, 061308 (Rapid Comm) (Cited 14)
Impact fator – 3.5

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Books:

1. **Nuclear Structure and Dynamics**
Editors: Ashok K. Jain and Ranjan K. Bhowmik
(Phoenix Publications, New Delhi, 2000).
2. **Proceedings of the Second National Workshop on Nuclear Structure Physics**
Editors: Surya N. Chintalpudi and Ashok K. Jain,
(Inter-Univ. Consortium of DAE Facilities, Calcutta, 1995).

A. Major Papers:

3. **Intrinsic States of Deformed Odd-A Deformed Nuclei in the Mass Regions ($151 \leq A \leq 193$) and ($A \geq 221$)**
A.K. Jain, R.K. Sheline, P.C. Sood and Kiran Jain
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