CURRICULUM-VITAE

Name:	Dr. BIJAYA KUMAR SAHOO
Date of birth:	2nd May 1977
Citizenship:	Indian
Mother tongue:	Oriya
Other spoken languages:	Hindi, Bengali, English, German, Dutch

Current Address:

Dr. B. K. Sahoo
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Dr. Bijaya Kumar Sahoo
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Professional positions:

Reader, Theoretical Physics Division, PRL from June, 2010

Post Doctoral Fellow and Project Leader of project "Atomic parity violation as a high-precision test of the unified electroweak theory" with project number 680-47-128 financed by "NWO-VENI programme" from the Netherlands to work at Kernfysisch Versneller Instituut (KVI), RuG University, Groningen, The Netherlands from October 2008 to June 2010.

Post Doctoral Fellow on "FOM Fellowship": Kernfysisch Versneller Instituut (KVI), RuG University, Groningen, The Netherlands from March 2008 to October 2008.

Post Doctoral Fellow on "Visitors Programme Fellowship": Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, April 2006 to March 2008

Guest Scientist on "DAAD Scholarship": GSI, Darmstadt, Germany, June 2004 - March 2006

Education:

Doctor of Philosophy (Atomic Physics): Indian Institute of Astrophysics, India, January 2000 - September 2005

Master of Science (Particle physics as special subject, First class): Utkal University, India, September 1997 - August 1999

Bachelor of Science (Physics Honors, First class with "Distinction"): Nayagarh college, India, August 1994 - May 1997

Intermediate in Science (First class (PCMB)): Nayagarh College, India, August 1992 - May 1994

Matriculation (First division): Mahipur High School, India, April 1992

AWARD/HONOR

1. Qualified "GATE" (1999).

2. Qualified "NET(CSIR-JRF)" two times: December (1998) and June (1999).

3. "DAAD Scholarship" under the "Sandwich Model" from 01.10.2004 to 31.03.2006 and I carried out a part of my research work at GSI under Dr. Thomas Beier, Darmstadt, Germany during this period.

4. "The Best Thesis Award" for the year 2006 on my PhD thesis by the Indian Association of Atomic and Molecular Physics at XVI National Conference on Atomic and Molecular Physics (8 - 11 January, 2007), TIFR, Bombay, India.

5. "Postdoctoral fellowship" from Max-Planck institute for the physics of complex systems from 2006 to 2008.

6. "Postdoctoral fellowship" from FOM, the Netherlands to work at KVI, University of Groningen for 2008.

7. "NWO-VENI fellowship" from NWO(N), the Netherlands to work at KVI, University of Groningen for 2009-2012 (terminated in June, 2010).

8. "Young International Scientists Fellowship" award from the Chinese Academy of Sciences (CAS) in 2010.

9. "Research Fellowship" from the National Natural Science Foundation of China (NSFC) in 2010.

10. "Financial support" by Department of Science & Technology (DST), India to attend a workshop at ECT*,Trento, Italy from 15-19 Nov. 2010 under Young Scientist scheme.

11. "Professor S. N. Ghosh Award for Young Scientists in Atomic & Molecular Physics for the year 2010" by the Indian Association of Atomic and Molecular Physics at the biennial conference of the Society held at Karnataka University, Dharwad during 22-25 February, 2011.

12. "First best prize" given by the Indian Physical Society for the presentation of the paper entitled *Atomic probes of fundamental interactions* in the Colloquium for Young Physicists, 18-19 August, 2011.

13. "S N Ghosal Award" given by the Indian Physical Society as the best Young Physicist for the presentation of the paper entitled *Atomic probes of fundamental interactions* in the Colloquium for Young Physicists, 18-19 August, 2011.

14. Indian National Science Academy (INSA) Medal for "Young Scientists" in 2012.

Research Projects:

(i) **Pre-doctoral project:** *"A New Approach to Relativistic Hartree-Fock (Dirac-Fock) Theory of Atoms"* under the supervision of Prof. Bhanu Pratap Das at Indian Institute of Astrophysics, Bangalore, India from April-2001 to October-2001.

(ii) **Doctoral thesis:** "Coupled-cluster Theory of Parity Non-conservation in Atoms" under the supervision of Prof. Bhanu Pratap Das, Indian Institute of Astrophysics, Koramangala, Bangalore, India from November-2001 to September-2005.

Research Interests:

I) *Theory of atomic electric dipole moments (EDMs) arising from parity and time-reversal/CP violation and its role in testing the Standard Model of Particle Physics.*

II) *Parity non-conservation (PNC) in atomic systems to probe the Standard Model (SM) of particle physics using the relativistic many-body theory.*

III) *Atomic parity non-conservation arising from the nuclear anapole moment to gain insights into parity violating nuclear interactions.*

IV) *Search for new candidates for atomic clocks.*

V) *Studies of quantum phase transitions in cold atoms and breached-pair*

phase in the BEC-BCS crossover.

V) *Strong electron correlation effects in heavy atomic systems, molecules, clusters and accurate estimation of atomic properties.*

VI) *Determination of nuclear properties from atomic studies.*

VII) *Applications of atomic physics to astrophysics.*

VIII) *Isotope shifts and absolute nuclear charge radii.*

IX) *Fine structure constant variation and implications to cosmology.*

X) *High precision test of atomic many-body theories.*

SCHOOLS AND CONFERENCES ATTENDED:

1. International Conference on Perspectives in Theoretical Physics, Physical Research Laboratory, Ahmedabad , India, January 8 - 12 (2001).
2. Young Astronomers Meeting, IUCAA, Pune, India, February, 2002
3. Science and Engineering Research Council (SERC) School on "High energy physics", Utkal University, Bhubaneswar, India, 17th January, 2002-10th February (2002).
4. School on "Distributed Parallel Computer Programming (DPCP-02)", Harish Chandra Research Institute, Allahabad, India, 11th April-19th April (2002).
5. Science and Engineering Research Council (SERC) School on "Precision Spectroscopy of Atoms, Molecules and Bose Condensates", IISc, Bangalore, India, February 20 to March 12 (2003).
6. XVI National Conference on Atomic and Molecular Physics, TIFR, Bombay, India, (8 - 11 January, 2007).
7. DPG meeting on Atomic physics, Düsseldorf, Germany (2007).
8. LCC 2007, MPIPKS, Dresden, Germany (2007).
9. Workshop on "Atomic, Chemical, and Nuclear Developments in Coupled Cluster Methods (INT-08-2a)", INT, University of Washington, Seattle, USA (2008).
10. 434. Wilhelm und Else Heraeus-Seminar "Precision Experiments at Lowest Energies for Fundamental Tests and Constants", Physikzentrum Bad Honnef, Germany (2009).
11. VIII International Workshop on "APPLICATION OF LASERS AND STORAGE DEVICES IN ATOMIC NUCLEI RESEARCH: Recent Achievements and Future Prospects", Poznan, Poland (2009).
12. International Conference on Cold Atoms and Ions 2010 (ICCIA10), Kolkata, India (2010).

13. Workshop on "Violations of discrete Symmetries in Atoms and Nuclei", ECT*, Trento, Italy (November 2010).

14. 2^{nd} DAE-BRNS Symposium on Atomic, Molecular and Optical Physics (SAMOP-2011) held at Karnataka University, Dharwad, India (January 2011).

15. The ISAMP topical conference on "Laser interactions with atoms, molecules and cluster" (TC2012) held at Hyderabad Central University, Hyderabad, India (January 2012).

SEMINAR TALKS IN INDIA:

1. Young Astronomers Meeting, IUCAA, Pune, February (2002).

2. School on Distributed Parallel Computer Programming (DPCP-02), Harish Chandra Research Institute, Allahabad, April (2002) (volunteer talk).

3. Department of Physical Chemistry, IACS, Kolkata, October (2002).

4. SERC school on "Precision Spectroscopy of Atoms, Molecules and Bose Condensates", IISc, Bangalore, February (2003) (volunteer talk).

5. Colloquium at Indian Institute of Astrophysics, Bangalore (September, 2005).

6. Best thesis award talk at XVI National Conference on Atomic and Molecular Physics (8-11 Jan), TIFR, Bombay, January (2007).

7. IISER, Kolkata, March (2009).

8. Raman Center for Atomic, Molecular and Atomic Physics, IACS, Kolkata, March (2009).

9. Atomic and Nuclear physics, TIFR, Bombay, March (2009).

10. Theoretical Physics Division, PRL, Ahemedabad, April (2009).

11. IISER, Bhopal, April (2009).

12. Department of Physical Sciences, JNU, April (2009).

13. Invited talk at International Conference on Cold Atoms and Ions 2010 (ICCIA10), Kolkata, January (2010).

14. Colloquium, Physical Research Laboratory, Ahmedabad, August (2010).

15. Invited talk at 2^{nd} DAE-BRNS Symposium on Atomic, Molecular and Optical Physics (SAMOP-2011) held at Karnataka University, Dharwad, February (2011).

16. Invited talk at the ISAMP topical conference on "Laser interactions with atoms, molecules and cluster" (TC2012) held at Hyderabad Central University, Hyderabad, India (January 2012).

17. Invited talk at Indo-UK Scientific Seminar (IUSS) held at NISER, Bhubaneswar, India (March 2012).

SEMINAR TALKS ABROAD:

1. Atomphysik, Mainz University, Mainz, Germany, May (2003).

2. Atomphysik, GSI, Darmstadt, Germany, May (2003).

3. Theoretical Chemistry Dept., Heidelberg, Germany, May (2003).

4. KVI, Groningen, the Netherlands, May (2003).

5. Atomphysik, Humboldt University, Berlin, Germany, April (2005).

6. Laboratori Nazionali di Lignaro, Padova, Italy, July (2005).

7. INFN, Sezione di Ferrara, Ferrara, Italy, July (2005).

8. BEC Group, INFM, Trento, Italy, November (2005).

9. MPI for Physics of Complex Systems, Dresden, Germany, December (2005).

10. Doktorandenseminar, GSI, Darmstadt, Germany, January (2006).

11. Atomfysik, Stockholm university, Stockholm, Sweden, January (2006).

12. Institute of Chemistry, Eötvös Loránd University, Budapest, Hungary, August (2006).

13. Finite system group seminar, Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, September (2006).

14. JAM session talk, Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, October (2006).

15. Electron Correlations group talk, Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, October (2006).

16. DPG meeting on atomic physics, Düsseldorf, Germany, March (2007).

17. KVI, Groningen, the Netherlands, March (2007).

18. Invited talk at SPARC Working Group Meeting, GSI, Darmstadt, Germany, July (2007).

19. Institute of Chemistry, Eötvös Loránd University, Budapest, Hungary, February (2008).

20. Invited talk at Workshop on "Atomic, Chemical, and Nuclear Developments in Coupled Cluster Methods (INT-08-2a)", INT, University of Washington, Seattle, USA, July (2008).

21. Invited talk at 434. Wilhelm und Else Heraeus-Seminar "Precision Experiments at Lowest Energies for Fundamental Tests and Constants", Physikzentrum Bad Honnef, Germany, June (2009).

22. Invited talk at VIII International Workshop on "APPLICATION OF LASERS AND STORAGE DEVICES IN ATOMIC NUCLEI RESEARCH: Recent Achievements and Future Prospects", Poznan, Poland, June (2009).

23. Department of Atomic and Molecular Physics, Harbin Institute of Technology, Harbin, China, September (2009).

24. Institute of Physics and Mathematics, Chinese Academy of Sciences, Wuhan, China, September (2009).

25. Laboratory of Optical Physics, National Laboratory of Condensed Matter Physics, Chinese Academy of Sciences, Beijing, China, September (2009).

26. Engineering College of Chemistry and Molecular Physics, Peiking University, Beijing, China, September (2009).

27. Theoretical Physics group seminars, KVI, University of Groningen, The Netherlands, June (2010).

28. Invited talk at ECT* workshop, Trento, Italy, November (2010).

29. Institute of Physics and Mathematics, Chinese Academy of Sciences, Wuhan, China, December (2011).

30. Engineering College of Chemistry and Molecular Physics, Peiking University, Beijing, China, December (2011).

31. Institute of Physics and Mathematics, Chinese Academy of Sciences, Wuhan, China, December (2011).

Few recent publications:

1. D. K. Nandy, Yashpal Singh, B. P. Shah and **B. K. Sahoo**, *Transition properties of a potassium atom*, Submitted to Phys. Rev. A

2. Yashpal Singh, D. K. Nandy and **B. K. Sahoo**, *Reexamining Nuclear Quadrupole Moments in $^{39-41}K$ Isotopes*, Phys. Rev. A **86**, 032509 (2012).

3. B. Arora and **B. K. Sahoo**, *State-insensitive trapping of Rb atoms: linearly versus circularly polarized light*, Phys. Rev. A **86**, 033416 (2012).

4. N. C. Lewty, B. L. Chuah, R. Cazan, **B. K. Sahoo** and M. D. Barrett, *Spectroscopy on a single trapped* ^{137} Ba^+ *ion for nuclear magnetic octupole moment determination*, Optics Express **20**, 21379 (2012).

5. **B. K. Sahoo** and B. P. Das, Ba^+ *Quadrupole Polarizabilities: Theory versus Experiment*, Phys. Rev. A **86**, 022506 (2012).

6. L. W. Wansbeek, S. S. Schlesser, **B. K. Sahoo**, A. E. L. Dieperink, C. J. G. Onderwater, and R. G. E. Timmermans, *Charge radii of radium isotopes*, Phys. Rev. C **86**, 015503 (2012).

7. B. Arora, D. K. Nandy and **B. K. Sahoo**, *Multipolar Black Body Radiation Shifts for the Single Ion Clocks*, Phys. Rev. A **85**, 012506 (2012).

Publications topicswise:

I. Electric dipole moments (P, T and CP violation) in atoms:

1. **B. K. Sahoo**, R. K. Chaudhuri, B. P. Das, D. Mukherjee and E. P. Venugopal, *Atomic Electric Dipole Moments From Higgs Boson Mediated Interactions*, Phys. Rev. A **78**, 010501(R) (2008); Erratum: Phys. Rev. A 78, 039901 (2008).

2. H. S. Nataraj, **B. K. Sahoo**, B. P. Das, R. K. Chaudhuri and D. Mukherjee, *The electric dipole moment enhancement factors of rubidium and cesium atoms*, J. Phys.: Conference Series **80**, 012050 (2007) (Invited paper).

3. H. S. Nataraj, **B. K. Sahoo**, B. P. Das, and D. Mukherjee, *Intrinsic Electric Dipole Moments of Paramagnetic Atoms: Rubidium and Cesium*, Phys. Rev. Lett. **101**, 033002 (2008).

4. D. Mukherjee, **B. K. Sahoo**, H. S. Nataraj and B. P. Das, *Relativistic Theory of the Electric Dipole Moment of an Atom due to the Electric Dipole Moment of an Electron*, J. Phys. Chem. A **113**, 12549 (2009).

5. H. S. Nataraj, **B. K. Sahoo**, B. P. Das, and D. Mukherjee, *A Reappraisal of the Electric Dipole Moment Enhancement Factor for Thallium*, Phys. Rev. Lett. **106**, 200403 (2011).

6. **B. K. Sahoo**, R. Pandey and B. P. Das, *The Search For A Permanent Electric Dipole Moment Using Atomic Indium*, Phys. Rev. A **84**, 030502(R) (2011).

II. Atomic parity non-conservation:

1. **B. K. Sahoo**, R. K. Chaudhuri, B. P. Das and D. Mukherjee, *Relativistic Coupled-Cluster Theory of Atomic Parity Nonconservation: Application to* $^{137}Ba^+$, Phys. Rev. Lett. **96**, 163003 (2006).

2. B. P. Das, **B. K. Sahoo**, G. Gopakumar and R. K. Chaudhuri, *Application of Relativistic Coupled-cluster Theory to Atomic Parity Non-conservation*, J.

of Mol. Str.: THEOCHEM **768**, 141 (2006) (invited paper).

3. **B. K. Sahoo**, B. P. Das, R. K. Chaudhuri and Debashis Mukherjee, *Theoretical studies of the* $6s\ ^2S_{1/2} \rightarrow 5d\ ^2D_{3/2}$ *parity non-conserving transition amplitude in* Ba^+ *and associated properties*, Phys. Rev. A **75**, 032507 (2007).

4. L. Wansbeek, **B. K. Sahoo**, R. G. E. Timmermans, K. Jungmann, B. P. Das, and D. Mukherjee, *Atomic parity non-conservation in* Ra^+, Phys. Rev. A **78**, 050501(R) (2008).

5. **B. K. Sahoo**, *Ab initio studies of electron correlation effects in the atomic parity violating amplitudes in Cs and Fr*, J. Phys. B **43**, 085005 (2010).

6. **B. K. Sahoo**, P. Mandal and M. Mukherjee, *Parity Nonconservation Studies in Odd-isotopes Single Trapped Atomic Ions*, Phys. Rev. A **83**, 030502(R) (2011).

7. **B. K. Sahoo** and B. P. Das, *Parity nonconservation in ytterbium ion*, Phys. Rev. A **84**, 010502(R) (2011).

III. Cold atoms on optical lattices and Bose-Einstein condensation:

1. T. Mishra, **B. K. Sahoo** and R. Pai, *Phase transitions in two species bosons using extended Bose-Hubbard model Hamiltonian*, Phys. Rev. A **78**, 013632 (2008).

2. L. Wansbeek, **B. K. Sahoo**, R. G. E. Timmermans, B. P. Das and D. Mukherjee, *Ab initio determination of polarizabilities and van der Waals coefficients of Li atoms using the relativistic coupled-cluster method*, Phys. Rev. A **78**, 012515 (2008); Erratum: Phys. Rev. A 82, 029901 (2010).

IV. Atomic clocks and laser interactions:

1. C. Sur, K. V. P. Latha, **B. K. Sahoo**, R. K. Chaudhuri, B. P. Das and D. Mukherjee, *Electric quadrupole moment of the D states of alkaline-earth-metal ions*, Phys. Rev. Lett. **96**, 193001 (2006).

2. **B. K. Sahoo**, *Relativistic coupled-cluster theory of quadrupole moments and hyperfine structure constants of* $5d$*- states in* Ba^+, Phys. Rev. A **74**, 020501(R) (2006).

3. **B. K. Sahoo**, B. P. Das, R. K. Chaudhuri, D. Mukherjee, R. G. E. Timmermans and K. Jungmann, *Investigations of* Ra^+ *properties to test possibilities of new optical frequency standards*, Phys. Rev. A **76**, 040504(R) (2007).

4. **B. K. Sahoo**, R. G. E. Timmermans, B. P. Das and D. Mukherjee, *Comparative studies of polarizabilities and their applications to optical frequency standards in* Sr^+, Ba^+ *and* Ra^+, Phys. Rev. A **80**, 062506 (2009).

5. Mihály Kállay, H. S. Nataraj, **B. K. Sahoo**, B. P. Das and Luuk Visscher, *Relativistic general-order coupled-cluster method for high-precision cal-*

culations: Application to the Al^+ atomic clock, Phys. Rev. A **83**, 030503(R) (2011).

6. Bindiya Arora, D. K. Nandy and **B. K. Sahoo**, it Multipolar Black Body Radiation Shifts for the Single Ion Clocks, Phys. Rev. A **85**, 012506 (2012).

7. B. Arora and **B. K. Sahoo**, *State-insensitive trapping of Rb atoms: linearly versus circularly polarized light*, Phys. Rev. A **86**, 033416 (2012).

V. Nuclear properties:

1. **B. K. Sahoo**, *Determination of Nuclear Quadrupole Moment of ^{87}Sr*, Phys. Rev. A **73**, 062501 (2006).

2. **B. K. Sahoo**, *Nuclear Quadrupole Moment of ^{43}Ca and hyperfine interactions in its singly charged ion*, Phys. Rev. A **80**, 012515 (2009).

3. L. W. Wansbeek, S. S. Schlesser, **B. K. Sahoo**, A. E. L. Dieperink, C. J. G. Onderwater, and R. G. E. Timmermans, *Charge radii of radium isotopes*, Phys. Rev. C **86**, 015503 (2012.

4. Yashpal Singh, D. K. Nandy and **B. K. Sahoo**, *Reexamining Nuclear Quadrupole Moments in $^{39-41}K$ Isotopes*, Phys. Rev. A **86**, 032509 (2012).

VI. Polarizabilities:

1. **B. K. Sahoo**, *An ab initio relativistic coupled-cluster theory of dipole and quadrupole polarizabilities: Applications to a few alkali atoms and alkaline earth ions*, Chem. Phys. Lett **448**, 144 (2007).

2. **B. K. Sahoo**, B. P. Das, R. K. Chaudhuri and D. Mukherjee, *A coupled-cluster approach to polarizabilities: Computational aspects*, J. Comp. Methods in Sci. and Eng. **7**, 57 (2007) (Invited paper).

3. **B. K. Sahoo** and B. P. Das, *Accurate determination of ground state dipole and quadrupole polarizabilities in Mg, Ca, Sr, Ba and Yb*, Phys. Rev. A **77**, 062516 (2008).

4. **B. K. Sahoo**, B. P. Das and D. Mukherjee, *Relativistic coupled-cluster studies of ionization potentials, lifetimes and polarizabilities in the singly charged calcium*, Phys. Rev. A **79**, 052511 (2009).

5. **B. K. Sahoo**, L. Wansbeek, K. Jungmann and R. G. E. Timmermans, *Light shifts and electric dipole matrix elements in Ba^+ and Ra^+*, Phys. Rev. A **79**, 052512 (2009).

6. **B. K. Sahoo** and B. P. Das, *Ba^+ Quadrupole Polarizabilities: Theory versus Experiment*, Phys. Rev. A **86**, 022506 (2012).

VII. Hyperfine structures:

1. **B. K. Sahoo**, S. Majumder, R. K. Chaudhuri, B. P. Das and D. Mukherjee, *Influence of correlation effects on the magnetic dipole hyperfine interaction in the low-lying states of* Ca^+, J. Phys. B. **36**, 1899 (2003).

2. **B. K. Sahoo**, G. Gopakumar, H. Merlitz, R. K. Chaudhuri, B. P. Das, U. S. Mahapatra and D. Mukherjee, *Magnetic dipole hyperfine interactions in* $^{137}Ba^+$ *and the accuracies of the neutral weak interaction matrix elements*, Phys. Rev. A **68**, 040501(R) (2003).

3. C. Sur, **B. K. Sahoo**, R. K. Chaudhuri, B. P. Das and D. Mukherjee, *Comparative studies of the magnetic dipole and electric quadrupole hyperfine constants for the ground and low lying excited states of* $^{25}Mg^+$, Eur. Phys. J. D **32**, 25 (2005).

4. **B. K. Sahoo**, R. K. Chaudhuri, B. P. Das, H. Merlitz and D. Mukherjee, *Application of Relativistic Coupled-cluster Theory to Heavy Atomic System with Strongly Interacting Configuration: Hyperfine Interactions in* $^{207}Pb^+$, Phys. Rev. A **72**, 032507 (2005).

5. **B. K. Sahoo**, Thomas Beier, B. P. Das, R. K. Chaudhuri and Debashis Mukherjee, *Electron Correlation Effects in Hyperfine Interactions in* ^{45}Sc *and* ^{89}Y, J. Phys. B **38**, 4379 (2005).

6. S. Majumder, **B. K. Sahoo**, R. K. Chaudhuri, B. P. Das and Debashis Mukherjee, *Many-body Effects in Hyperfine Interactions in* $^{205}Pb^+$, Euro. J. Phys. D **41**, 441 (2007).

7. **B. K. Sahoo**, C. Sur, Thomas Beier, B. P. Das, R. K. Chaudhuri and Debashis Mukherjee, *Spectacular Role of Electron Correlation in the Hyperfine Interactions in* $^2D_{5/2}$ *States in Alkaline Earth Ions*, Phys. Rev. A **75**, 042504 (2007).

8. G. Dixit, H. S. Nataraj, **B. K. Sahoo**, R. K. Chaudhuri and S. Majumder, *Relativistic calculations of the lifetimes and hyperfine structure constrants in* $^{67}Zn^+$, J. Phys. B **41**, 025001 (2008).

9. G. Dixit, H. S. Nataraj, **B. K. Sahoo**, R. K. Chaudhuri and S. Majumder, *Ab initio relativitic many-body calculations of hyperfine splitting in* $^{113}Cd^+$, Phys. Rev. A **77**, 012718 (2008).

VIII. Ionization potentials and Electron affinity energies:

1. R. K. Chaudhuri, **B. K. Sahoo**, B. P. Das, U. S. Mahapatra and D. Mukherjee, *Relativistic coupled cluster calculations of the energies for Rubidium and Cesium atoms*, J. Chem. Phys. **119**, 10633 (2003).

2. B. P. Das, K. V. P. Latha, **B. K. Sahoo**, C. Sur, R. K. Chaudhuri and D. Mukherjee, *Relativistic and correlation effects in atoms*, J. of Theor. and

Comp. Chemistry **4**, 1 (2005) (invited paper).

IX. Transition amplitudes and lifetimes:

1. **B. K. Sahoo**, S. Majumder, R. K. Chaudhuri, B. P. Das and D. Mukherjee, *Ab initio determination of the lifetime of the* $6^2P_{3/2}$ *state for* $^{207}Pb^+$ *by relativistic many-body theory*, J. Phys. B **37**, 3409 (2004).

2. **B. K. Sahoo**, S. Majumder, H. Merlitz, R. K. Chaudhuri, B. P. Das and D. Mukherjee, *Electric Dipole Transition Amplitudes for* $^{207}Pb^+$, J. Phys. B **39**, 355 (2006).

3. **B. K. Sahoo**, Md. R. Islam, B. P. Das, R. K. Chaudhuri and Debashis Mukherjee, *Lifetimes of the metastable* $D_{3/2,5/2}$ *states in* Ca^+, Sr^+ *and* Ba^+, Phys. Rev. A **74**, 062504 (2006).

4. H. S. Nataraj, **B. K. Sahoo**, B. P. Das, R. K. Chaudhuri and D. Mukherjee, *Application of the relativistic coupled-cluster theory to boron-like ions of astrophysical interest*, J. Phys. B **40**, 3153 (2007).

5. G. Dixit, **B. K. Sahoo**, P. C. Deshmukh, R. K. Chaudhuri and S. Majumder, *Accurate estimations of circumstellar and interstellar lines of quadruply ionized vanadium using coupled-cluster approach*, Astro. Phys. J (suppl. ser.) **172**, 645 (2007).

6. G. Dixit, **B. K. Sahoo**, R. K. Chaudhuri and S. Majumder, *Ab initio calculations of forbidden transition probabilities and lifetimes of low-lying states in* V^{4+}, Phys. Rev. A **76**, 042505 (2007).

7. C. Sur, R. K. Chaudhuri, **B. K. Sahoo**, B. P. Das and D. Mukherjee, *Relativistic unitary coupled-cluster theory and applications*, J. Phys. B **41**, 065001 (2008).

8. S. Mandal, G. Dixit, **B. K. Sahoo**, R. K. Chaudhuri and S. Majumder, *Ab initio calculations of forbidden transition probabilities and lifetimes of low-lying states in Ti IV*, J. Phys. B **41**, 055701 (2008).

9. **B. K. Sahoo**, H. S. Nataraj, B. P. Das, R. K. Chaudhuri and Debashis Mukherjee, *Theoretical determination of lifetimes of metastable states in Sc III and Y III*, J. Phys. B **41**, 055702 (2008).

10. G. Dixit, **B. K. Sahoo**, R. K. Chaudhuri and S. Majumder, *Accurate ab initio study of interstellar forbidden lines of singly ionized zinc using the coupled-cluster approach*, J. Phys. B **42**, 165702 (2009).

11. N. N. Dutta, G. Dixit, **B. K. Sahoo** and S. Majumder, *Ab initio calculations of oscillator strengths and lifetimes of low-lying states in Mo VI*, arXiv:1007.5389 (Submitted to J. Phys. B).

12. **B. K. Sahoo** and B. P. Das, *Transition Properties of Low Lying States in Atomic Indium*, Phys. Rev. A **84**, 012501 (2011).

13. D. K. Nandy, Yashpal Singh, **B. K. Sahoo** and Chengbin Li, *Sc III spectral properties of astrophysical interest*, J. Phys. B **44**, 225701 (2011).

13. D. K. Nandy, Yashpal Singh, B. P. Shah and **B. K. Sahoo**, *Transition properties of a potassium atom*, Submitted to Phys. Rev. A

X. Variation of fine structure constant α:

1. **B. K. Sahoo**, *Accurate estimate of α variation and isotope shift parameters in Na and Mg^+*, J. Phys. B **43**, 231001 (Fast Track Communication) (2010).

XI. In combination with experiments:

1. O. O. Versolato, G. S. Giri, L. W. Wansbeek, J. E. van den Berg, D. J. van der Hoek, K. Jungmann, W. L. Kruithof, C. J. G. Onderwater, **B. K. Sahoo**, B. Santra, P. D. Shidling, R. G. E. Timmermans, L. Willmann, H. W. Wilschut, *On-line Excited-State Laser Spectroscopy of Trapped Short-Lived Ra^+ Ions*, Phys. Rev. A **82**, 010501(R) (2010).

2. D. Budker, **B. K. Sahoo**, D. Angom and B. P. Das, *An Overview of Some Experimental and Theoretical Aspects of Fundamental Symmetry Violations in Atoms*, Pramana—journal of physics (Indian Academy of Sciences) **75**, 1041 (2010).

3. N. C. Lewty, B. L. Chuah, R. Cazan, **B. K. Sahoo** and M. D. Barrett, *Spectroscopy on a single trapped ^{137} Ba^+ ion for nuclear magnetic octupole moment determination*, Optics Express **20**, 21379 (2012).

XII. Proceeding papers:

1. G. S. Giri, O. O. Versolato, L. W. Wansbeek, J. E. van den Berg, D. J. van der Hoek, K. Jungmann, W. L. Kruithof, C. J. G. Onderwater, **B. K. Sahoo**, B. Santra, P. D. Shidling, R. G. E. Timmermans, L. Willmann, H. W. Wilschut *Precision Spectroscopy of Trapped Radioactive Radium Ions*, Can. J. Phys. **89**, 69 (2011).

2. O. O. Versolato, L. W. Wansbeek, G. S. Giri, J. E. van den Berg, D. J. van der Hoek, K. Jungmann, W. L. Kruithof, C. J. G. Onderwater, **B. K. Sahoo**, B. Santra, P. D. Shidling, R. G. E. Timmermans, L. Willmann, H. W. Wilschut *Atomic Parity Violation in a Single Trapped Radium Ion*, Can. J. Phys. **89**, 65 (2011).

3. O. O. Versolato, L. W. Wansbeek, G. S. Giri, J. E. van den Berg, D. J. van der Hoek, K. Jungmann, W. L. Kruithof, C. J. G. Onderwater, **B. K. Sahoo**, B. Santra, P. D. Shidling, R. G. E. Timmermans, L. Willmann, H. W. Wilschut *Atomic Parity Violation in a Single Trapped Radium Ion*, Hyperfine Interactions, **199**, 9-19 (2011).

4. B. P. Das, H. S. Nataraj and **B. K. Sahoo**, *Theoretical Stdies of Magnetic Dipole Hyperfine Interaction Constants of Low-lying States in Tl*, (Submit-

ted to Asian journal of physics).

Posters

1. H. S. Nataraj, B. P. Das, **B. K. Sahoo**, R. K. Chaudhuri and D. Mukherjee, *The electric dipole moment of electron: Test of P & T- violations*, AISAMP7, IIT Madras, December (2006).

2. Gopal Dixit, P. C. Desmukh, **B. K. Sahoo** and Sonjoy Majumder, *Many-body effects in hyperfine interaction in Tl III*, SAMQCP (2007).

3. **B. K. Sahoo**, *Accurate estimations of polarizabilities using the relativistic coupled-cluster theory*, LCC2007, MPIPKS, Dresden, Germany (2007).

4. H. S. Nataraj, B. P. Das, **B. K. Sahoo**, R. K. Chaudhuri and D. Mukherjee, *Search for the electric dipole moment of the electron using cold atoms*, Indo-French Workshop for Young Scientists on Lasers, Quantum Optics and Bio-physics, Oct 29 - Nov. 2, Gif-sur-Yvette, near Paris, France (2007).

5. H. S. Nataraj, B. P. Das, **B. K. Sahoo** and D. Mukherjee, *Electric dipole moments of paramagnetic atoms* , ICAP, USA (2008).

6. O. Böll, G. S. Giri, O. O. Versolato, **B. K. Sahoo**, R. G. E. Timmermans, L. Wansweek, K. Jungmann and L. Willmann, *Atomic clock with* Ra^+, Nederland physics association meeting, Veldhoven (2009).

7. G. S. Giri, O. O. Versolato, L. Wansweek, **B. K. Sahoo**, R. G. E. Timmermans, K. Jungmann and L. Willmann, *Parity non-conservation in singly charged radium*, Nederland physics association meeting, Veldhoven (2009).

8. O. Böll, G. S. Giri, O. O. Versolato, L. Wansweek, **B. K. Sahoo**, R. G. E. Timmermans, K. Jungmann and L. Willmann, *Parity non-conservation in singly charged radium*, Bad-Honnef, Germany (2009).

9. G. S. Giri, **B. K. Sahoo**, O. O. Versolato, L. Wansweek, L. Willmann, H. W. Wilschut, K. Jungmann and R. G. E. Timmermans, *Isotope shifts and Hyperfine structure of* $^{212214}Ra^+$, DPG meeting, Hannover, Germany (2010).

10. Y. Singh, D. Nandy, C. Li and **B. K. Sahoo**, *Spectral properties in Sc III of Astrophysical Interest*, RAMIT 2011, Puri, Odisha, India.

11. D. Nandy, B. Arora and **B. K. Sahoo**, *Multipolar BBR shifts in the singly charged ions*, RAMPT 2011, Puri, Odisha, India.

12. Y. Singh, D. Nandy, C. Li and **B. K. Sahoo**, *Role of many-body methods for spectral studies*, WHCI 2012, TIFR, India.

13. D. Nandy, B. Arora and *B. K. Sahoo*, *Accurate determination of multipolar BBR shifts for the singly charged atomic clocks*, WHCI 2012, India.

Collaborations:

1. Parity violation single radium ion group, KVI, Groningen, The Netherlands (Please see: http://www.kvi.nl/∼radiumion/)

2. Non-accelerator particle physics group, IIAP, Bangalore, India

3. Department of physics, University of Goa, Goa, India

4. CDAC, Pune, India

5. Physics department, IIT Kharagpur, Kharagpur, India

6. Budapest University of Technology and Economics, 1111 Budapest, Hungary

7. Raman Center for Atomic, Molecular and Optical Sciences, IACS, Kolkata 70032, India

8. Institute of Physics and Mathematics, Chinese Academy of Sciences, Wuhan, China

9. Department of Physics, Guru Nanak University, Amritsar, Punjab.

10. Department of Physics, M S University, Borada, Gujrat.

11. National State University, Singapore.

Present doctoral students continuing under my direct guidance:

1. Dillip Nandy, Physical Research Laboratory (PRL), Ahmedabad India.

2. Yashpal Singh, Physical Research Laboratory (PRL), Ahmedabad India.

Doctoral students who had received my assistance:

1. H. S. Nataraj, Non-accelerator particle physics group, IIAP, Bangalore, India.

2. Gopal Dixit, Physics department, IIT Khargpur, Khargpur, India.

3. Lotje Wansbeek, KVI, Groningen, the Netherlands.

Professional activities

1. Referee of Physical Review Letters.

2. Referee of J. Phys. B: Atomic, molecular and optical physics.

3. Referee of J. Phys.: Condens. Matter.

4. Referee of Eur. Phys. D.

5. Referee of Monthly Notices of the Royal Astronomical Society.

6. Referee of Physical Review X.

7. Referee of Physical Review A.

Teaching experiences

1. Taught Quantum Mechanics course to the 2010 year batch PhD students of Physical Research Laboratory (PRL).

2. Taught Quantum Mechanics course to the 2011 year batch PhD students of Physical Research Laboratory (PRL).

Highlights of my reserach works

1. http://www.nature.com/doifinder/10.1038/nature05101

2. http://www.nature.com/nindia/2009/091220/full/nindia.2009.352.html

3. http://www.dnaindia.com/bangalore/report_pushing-frontiers-in-precision-time_1348116

4. http://www.quantumlah.org/highlight/121005_barium.php