

Resume

DR. SAMEEN AHMED KHAN

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Professional Summary

- Long academic career including Ten (10) years of research & (5) five years of teaching.
- Over twenty-five (25) *Research Articles* and one hundred (100) *Popular Writings*.
- Working as Assistant Professor at Salalah College of Technology (SCOT), Salalah, Sultanate of Oman, since May-2006
- Worked as Assistant Professor & Assistant Head at Middle East College of Information Technology (MECIT), from September 2003 to May 2006
- CONACYT-UNAM Postdoctoral Fellow, Centro de Ciencias Físicas, Universidad Nacional Autónoma de México, Cuernavaca, MÉXICO (October 2001 — October 2002).
- INFN Post-Doctoral Fellow, Istituto Nazionale di Fisica Nucleare (INFN), Dipartimento di Fisica Galileo Galilei, Università di Padova, ITALY (October 1997 — October 1999).
- Junior Research Fellow, Institute of Mathematical Sciences, Chennai, INDIA.
- Independent Research (see the peer-reviewed publications, 6-9 and the Book-Chapter)
- Won the State Level Mathematics Olympiads at Junior Level, Senior Level and Undergraduate Level conducted by The Andhra Pradesh Association of Mathematics Teachers (APAMT), Hyderabad, India.
- Young Physicists Colloquium: Lectured at the Young Physicists Colloquium Kolkata (Calcutta), August 1996, Organized by The Indian Physical Society (IPS).

Teaching Experience

1 SALALAH COLLEGE OF TECHNOLOGY, SALALAH, SULTANATE OF OMAN.

The college is one of the six colleges run by Ministry of Man Power. It has the Department of Engineering, Department of Information Technology, Department of Business Studies, English Language Centre and the Educational Technology Centre.

Responsibility: Teaching Physics and establishing a physics laboratory.

2 MIDDLE EAST COLLEGE OF INFORMATION TECHNOLOGY, MUSCAT, SULTANATE OF OMAN.

The Middle East College of Information Technology (MECIT) is the first college (established in 2002) dedicated to Information Technology (IT), not only in Oman but in

the region of Middle East. MECIT is housed in the Knowledge Oasis Muscat, which incorporates the IT Park of Muscat.

Responsibility: Teaching Physics and Mathematics; and participated as assistant head in establishing the Department of Mathematics and Applied Sciences.

Teaching: Two-semester sequence of Physics for Engineering; Three-Semester Sequence of Engineering Mathematics (Foundation Mathematics, College Mathematics, Calculus with Numerical Methods and Advanced Calculus) and Two-Semester Sequence of Physics (Physics, Engineering Mechanics and Engineering Physics).

Other Academic Activities

- Drafted the syllabus for the new BS Program.
- Set up the Department Homepage on the College Intranet, which contains in-house prepared Lecture Notes and Question Banks, meeting most of the requirements of all the courses offered by the department.
- Conducted the first Mathematics Olympiad in the College on 26 May 2004.
- Served on several College Committees (Disciplinary Committee, Journal Committee, Library Committee, Web-Site Committee, Prizes and Awards Committee, and Accreditation Steering Committee)

Educational Qualifications

- PhD (Physics), The Institute of Mathematical Sciences, Madras, India (1991-1997).
 - **Dissertation:** Development of quantum mechanical treatment for the study of transport of charged-particle beams through electromagnetic systems
 - **Advisor:** Professor Ramaswamy Jagannathan.
- M.S. (Physics), Indian Institute of Technology (IIT), Kanpur, India (1988-1990).
- B.S. Honors (Physics), Osmania University, Hyderabad, India (1985-1988).

Computer Literacy

Operating System	MS-Dos, UNIX/Linux, MS-Windows 95/98/2000/Xp
Languages	FORTRAN
Applications	MS-Office 2000/2003/Xp, LaTeX

Research Experience

#1 *CONACYT-UNAM Postdoctoral Fellow*, Centro de Ciencias Físicas, Universidad Nacional Autónoma de México, Cuernavaca, MÉXICO (October 2001 — October 2002).

Advisor: Professor Kurt Bernardino Wolf.

Research: Unified treatment of light beam optics and polarization.

The CONACYT-UNAM Fellowships are awarded by the Ministry of Science, Mexico to do research in Mexican Institutions.

#2 *INFN Post-Doctoral Fellow*, Istituto Nazionale di Fisica Nucleare (INFN), Dipartimento di Fisica Galileo Galilei, Università di Padova, ITALY (October 1997 — October 1999).

Advisor: Professor Modesto Pusterla.

Research: Beam Halo Problem.

INFN, the Italian National Agency for Nuclear Physics awards thirty Fellowships every year, based on a very competitive world-wide selection.

#3 *Junior Research Fellow*, Institute of Mathematical Sciences (IMSc), Chennai, India (1991-1997)

IMSc was set up in 1963 as a centre of advanced study to carry out research in frontline areas of physics and mathematics.

HONORS AND AWARDS

#1 Mathematics Olympiads: Won the State Level Mathematics Olympiads at: Junior Level (1983), Senior Level (1985) and Undergraduate Level (1986 to 1988), conducted by The Andhra Pradesh Association of Mathematics Teachers (APAMT), Hyderabad, India. The Mathematics Talent Exams (widely known as Mathematics Olympiads) are conducted to spot mathematical talent. The above Olympiads were conducted in the southern Indian state of Andhra Pradesh, which is the home to about seventy-six million people.

#2 Young Physicists Colloquium: Gave a Lecture at the Young Physicists Colloquium Kolkata (Calcutta), August 1996, Organized by the Indian Physical Society (IPS). This annual event has about twenty-five speakers, who present their research.

PROFESSIONAL AFFILIATIONS

- Member of American Physical Society since last three years
- Optical Society of America since last five years
- International Association of Mathematical Physics since a decade

Patents

Quadricmeter is the instrument devised to identify (distinguish) and measure the various parameters (axis, foci, latera recta, directrix, etc..) completely characterizing the important class of surfaces known as the quadratic surfaces. Quadratic surfaces (also known as quadrics) include a wide range of commonly encountered surfaces including, cone, cylinder, ellipsoid, elliptic cone, elliptic cylinder, elliptic hyperboloid, elliptic paraboloid, hyperbolic cylinder, hyperbolic paraboloid, paraboloid, sphere, and spheroid. Quadricmeter is a generalized form of the conventional spherometer and the lesser known cylindrometer (also known as the “Cylindro-Spherometer”). With a conventional spherometer it was possible only to measure the radii of spherical surfaces. Cylindrometer can measure the radii of curvature of a cylindrical surface in addition to the spherical surface. In both the spherometer and the cylindrometer one assumes the surface to be either spherical or cylindrical respectively. In the case of the quadricmeter, there are no such assumptions.

- Sameen Ahmed Khan,
Quadricmeter,
Official Journal of the Patent Office, Issue No. **43/2008**, Part-I, pp. 25296 (24 October 2008).
Application No.: **2126/MUM/2008 A**, International Classification: **B69G1/36**,
Controller General of Patents Designs and Trade Marks, Government of India.
http://ipindia.nic.in/ipr/patent/journal_archieve/journal_2008/patent_journal_2008.htm
http://ipindia.nic.in/ipr/patent/journal_archieve/journal_2008/pat_arch_102008/official_journal_24102008_part_i.pdf
<http://www.patentoffice.nic.in/>, <http://www.ipindia.nic.in/>
(*patent in process*, <http://www.geocities.com/rohelakhan/quadricmeter.html>).

Publications

BOOK CHAPTERS

- R. Jagannathan and S. A. Khan, **Quantum theory of the optics of charged particles**, *Advances in Imaging and Electron Physics*, Editors: P. W. Hawkes, B. Kazan and T. Mulvey, (Academic Press, San Diego, 1996) **Vol. 97**, pp. 257-358 (1996). (ISBN-10: 0120147394 and ISBN-13: 978-0120147397).
- Sameen Ahmed Khan, **Wavelength-Dependent Effects in Light Optics**, in *New Topics in Quantum Physics Research*, Editors: Volodymyr Krasnoholovets and Frank Columbus, (Nova Science Publishers, New York, 2006, <http://www.novapublishers.com/>) pp. 163-204 (30 December 2006). (ISBN-10: 1600210287 and ISBN-13: 978-1600210280).
- Sameen Ahmed Khan, **The Foldy-Wouthuysen Transformation Technique in Optics**, *Advances in Imaging and Electron Physics*, Editor: Peter W. Hawkes, (Elsevier, 2008) **Vol. 152**, pp. 49-78 (August 2008). (ISBN-10: 0123742196 and ISBN-13: 978-0-12-374219-3).

PEER-REVIEWED JOURNALS

1. S. A. Khan and R. Jagannathan, **On the quantum mechanics of charged particle beam transport through magnetic lenses**, *Physical Review E* **51**, 2510-2515 (1995).
2. M. Conte, R. Jagannathan, S. A. Khan and M. Pusterla, **Beam optics of the Dirac particle with anomalous magnetic moment**, *Particle Accelerators* **56**, 99-126 (1996).
3. S. A. Khan and M. Pusterla, **Quantum-like approach to the transversal and longitudinal beam dynamics. The halo problem**, *European Physical Journal A* **7** No. 4, 583-587 (2000).
4. Sameen Ahmed Khan and Modesto Pusterla, **Quantum approach to the halo formation in high current beams**, *Nuclear Instruments and Methods in Physics Research (NIMS) A* **464**, 461-464 (2001).
5. Sameen Ahmed Khan and Kurt Bernardo Wolf, **Hamiltonian orbit structure of the set of paraxial optical systems**, *Journal of the Optical Society of America (JOSA) A* **19** (12), 2436-2444 (December 2002).
6. Sameen Ahmed Khan, **Wavelength-dependent modifications in Helmholtz Optics**, *International Journal of Theoretical Physics*, **44** (1), 95-125 (January 2005), (Kluwer Academic Publishers, 2005, <https://www.editorialmanager.com/ijtp/>).
7. Sameen Ahmed Khan, **An Exact Matrix Representation of the Maxwell's Equations**, *Physica Scripta*, **71** (5), 440-442 (2005). (<http://www.physica.org/>).
8. Sameen Ahmed Khan, **The Foldy-Wouthuysen Transformation Technique in Optics**, *Optik - International Journal for Light and Electron Optics*, **117**, Issue 10, pp. 481-488 (October 2006) (Elsevier, <http://www.elsevier-deutschland.de/ijleo/>).
9. Sameen Ahmed Khan, **Maxwell Optics of Quasiparaxial Beams**, *Optik - International Journal for Light and Electron Optics*, **120**, Issue ??, pp. ???-??? (??? 2009) (Elsevier, <http://www.elsevier-deutschland.de/ijleo/>). (*in press*, Digital Object Identifier, <http://dx.doi.org/10.1016/j.ijleo.2008.07.027>).
10. Sameen Ahmed Khan, **Wavelength-dependent modifications in Maxwell Optics**, (*communicated*).
11. Sameen Ahmed Khan and Modesto Pusterla, **On the form of Lorentz-Stern-Gerlach force**, (*submitted*).

12. Sameen Ahmed Khan, Ramaswamy Jagannathan and Rajiah Simon, **Foldy-Wouthuysen transformation and a quasiparaxial approximation scheme for the scalar wave theory of light beams**, (*submitted*).

The corrections to the traditional descriptions derived in the above articles have a significant bearing on the celebrated Scherzer Theorem in the wavelength-dependent regime in electron microscopy and the algebraically equivalent system of fiber optics. An application for a patent shall be made in the near future!

PUBLICATIONS IN CONFERENCE PROCEEDINGS

1. S. A. Khan and R. Jagannathan, **Theory of relativistic electron beam transport based on the Dirac equation**, in: *Proceedings of the 3rd National Seminar on Physics and Technology of Particle Accelerators and their Applications PATPAA-93* (25-27 November 1993, Kolkata (Calcutta)), Editor: S. N. Chintalapudi (IUC-DAEF, Kolkata (Calcutta)), pp. 102–107.
 2. R. Jagannathan and S. A. Khan, **Wigner functions in charged particle optics**, in: *Selected Topics in Mathematical Physics—Professor R. Vasudevan Memorial Volume*, Editors: R. Sridhar, K. Srinivasa Rao, and V. Lakshminarayanan (Allied Publ., Delhi, India 1995), pp. 308-321.
 3. R. Jagannathan and S. A. Khan, **Quantum mechanics of accelerator optics**, *ICFA Beam Dynamics Newsletter*, **13**, pp. 21 - 27 (April 1997). (ICFA: International Committee for Future Accelerators).
 4. S. A. Khan, **Quantum theory of magnetic quadrupole lenses for spin- $1/2$ particles**, in: *Proceedings of the 15th Advanced ICFA Beam Dynamics Workshop on Quantum Aspects of Beam Physics*, (4-9 January 1998, Monterey, California USA), Editor: Pisin Chen, (World Scientific, Singapore, 1999), pp. 682-694.
 5. Sameen A. Khan, **Quantum aspects of accelerator optics** in: *Proceedings of the 1999 Particle Accelerator Conference PAC99*, (29 March - 02 April 1999, New York City, NY), Editors: A. Luccio and W. MacKay, (IEEE Catalogue Number: 99CH36366) pp. 2817-2819.
 6. Sameen A. Khan and Modesto Pusterla, **Quantum mechanical aspects of the halo puzzle**, in: *Proceedings of the 1999 Particle Accelerator Conference PAC99* (29 March - 2 April 1999, New York City, NY), Editors: A. Luccio and W. MacKay, (IEEE Catalogue Number: 99CH36366) pp. 3280-3281.
 7. Sameen A. Khan and Modesto Pusterla, **Quantum-like approaches to the beam halo problem**, in: *Proceedings of the 6th International Conference on Squeezed States and Uncertainty Relations ICSSUR'99*, (24-29 May 1999, Napoli, Italy, Editors: D Han, Y S Kim, and S Solimeno, (NASA Conference Publication Series 2000-209899) pp. 438-441 (July 2000).
 8. S. A. Khan, **Quantum formalism of beam optics**, in: *Proceedings of the 18th Advanced ICFA Beam Dynamics Workshop on Quantum Aspects of Beam Physics* (15-20 October 2000, Capri, Italy), Editor: Pisin Chen, (World Scientific, Singapore, June 2002). pp. 517-526.
 9. Sameen Ahmed Khan, **Analogies between light optics and charged-particle optics**, *ICFA Beam Dynamics Newsletter*, **27**, 42-48 (June 2002). (ICFA: International Committee for Future Accelerators).
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E. Expository Publications

1. Sameen Ahmed Khan, **The World of Synchrotrons**, *Resonance Journal of Science Education*, **6**, No. 11, pp. 77-84 (November 2001), (Monthly Publication of the Indian Academy of Sciences (IAS), Copublished with Springer). *E-Print*: <http://arXiv.org/abs/physics/0112086>.
Cited in the sections on *Synchrotrons* in *THE NET ADVANCE OF PHYSICS* (Review Articles and Tutorials in an Encyclopedic Format). <http://web.mit.edu/redingtn/www/netadv/Xsynchrotr.html>

2. Sameen Ahmed Khan, **Introduction to Synchrotron Radiation**, *Bulletin of the IAPT*, **19** (5), pp. 149-153 (May 2002). (**IAPT**: Indian Association of Physics Teachers).
3. Sameen Ahmed Khan, **Electron Beams for Radiation**, *Kiran*, **13** (3) pp. 40-42 (July 2002). (**Kiran**: Bulletin of the Indian Laser Association).
4. Azher Majid Siddiqui and Sameen Ahmed Khan, **Ion Beam Channeling and Accelerator Programmes in India**, *MRSI Newsletter*, Vol. **B 02**, Number 4, pp. 3-5 (October 2002). (**MRSI**: Materials Research Society of India).
5. Fathiya Khamis Al Rawahi, Sameen Ahmed Khan and Abdul Huq, **Microsoft Excel in the Mathematics Classroom: A Case Study**, in Proceedings of **The Second Annual Conference for Middle East Teachers of Mathematics, Science and Computing (METSMaC 2006)**, The Petroleum Institute, Abu Dhabi, United Arab Emirates, 14-16 March 2006. *Editors*: Sean M Stewart, Janet E. Olearski and Douglas Thompson, pp. 131-134 (2006).
6. Sameen Ahmed Khan, **Microsoft Excel in the Physics Classroom**, in *Proceedings of The Third Annual Conference for Middle East Teachers of Mathematics, Science and Computing (METSMaC 2007)*, The Petroleum Institute, Abu Dhabi, United Arab Emirates, 17-19 March 2007. *Editors*: Seán M. Stewart, Janet E. Olearski, Peter Rodgers, Douglas Thompson and Emer A. Hayes, pp. 171-175 (2007).
7. Sameen Ahmed Khan, **Data Analysis Using Microsoft Excel in the Physics Laboratory**, *Bulletin of the IAPT*, **24** (6), pp. 184-186 (June 2007). (**IAPT**: Indian Association of Physics Teachers).
8. Sameen Ahmed Khan, **Cylindro-Spherometer**, *Bulletin of the IAPT*, **26** (1), pp. 4-6 (January 2009). (**IAPT**: Indian Association of Physics Teachers).
9. Sameen Ahmed Khan, **Spherometer and Cylindrometer**, (*communicated*). The article discusses the traditional spherometer and some variants such as the ring spherometer and the cylindrometer (also known as Cylindro-Spherometer), fabricated by the author.

E-PRINTS

1. Sameen Ahmed Khan, **An Alternate way to obtain the aberration expansion in Helmholtz Optics**, <http://arxiv.org/abs/physics/0210001/>
2. Sameen Ahmed Khan, **Wavelength-Dependent effects in Maxwell Optics**, <http://arxiv.org/abs/physics/0210027/>

POPULAR WRITINGS: Over a hundred

REFERENCES: Available on request.

Updated on Friday the 10 April 2009.