LEE, Shyh-Yuan

1. **Present Position and Address**

Professor of Physics, Indiana University
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2. **Education**

   (a) National Taiwan University (1961-1966), B.S. in Physics
   (b) S.U.N.Y. Stony Brook (1968-1972), M.A. and Ph.D. in Physics

3. **Honour**

   (a) Humboldt Senior Research Award 2006

   (b) Former Graduate students:
   Dr. Mei Bai – Outstanding thesis award (1999)
   Dr. Haixin Huang – Faraday Cup award in instrumentation (2006)

4. **Experience**

   (a) University of Heidelberg and Max Planck Institute, Germany (1972-1974)
   (b) National Central University, Chung-Li, Taiwan (1974-1976)
   (c) University of Paris, Orsay (1976-1977)
   (d) University of Washington, Seattle (1977-1978)
   (e) S.U.N.Y. Stony Brook (1978-1984)
   (f) Academia Sinica, Nankang, Taipei (1982-1983).
   (g) Brookhaven National Laboratory, (1984-1990)
   (h) Indiana University, Bloomington (1990-present)

5. **Services**

   (a) Divisional Associate Editor, PRL (July 1, 2007 - June 30, 2010).
   (b) Chair of Education and Outreach Committee for the Division of Beam Physics, Americal Physics Society, 2005-2007. Chair of the Physics Teachers' Day at the PAC2007 in Albuquerque, NM, June 27, 2007.
   (c) The IEEE particle accelerator conference, program committee:1989, 1995, 1997, 2005, 2007.
   (d) Scientific Advisory Board for the European Particle Accelerator Conference 1996; 1998; 2000; 2002; 2004, 2006, 2008.
   (e) Member of the APS Wilson Prize Committee (2002-2004)
   (f) Chair of the 2003 USPAS prize committee (2003)

(g) Director of the US Particle Accelerator School (1998-2001)

(h) Member of the Science and technology steering committee, Brookhaven Science Associate, BNL (2003-); Member of the Program Advisory Committee, RHIC (2003-)

(i) Chair, Machine Advisory Committee, (SRRC, Taiwan Light Source, 2000-2002);member of the External Review Committee (2004-)

(j) A member of the Executive Committee for the Division of Physics of Beams (1998-2001).

(k) APS representative of the nomination committee to the Division of Physics of Beams (1997-1998).

(l) The International Committee for Future Accelerator (member of beam dynamics panel, 1994–1998) ; One of three editors of the ICFA beam dynamics newsletter published three times a year (1991-1998).

6. **Major contributions in accelerator physics**

- Proposed and designed the RHIC lattice with antisymmetric insertions (1985-1990). This lattice was accepted by the International Review Committee in 1985. The RHIC is essentially constructed based on this lattice.
- Spoke person for systematic experiments on nonlinear beam dynamics at the IUCF Cooler Ring (1990-1996). These studies provide detailed understanding of parametric and coupling resonances and the stochasticity for particle beams in accelerators. These results have been applied to understand resonances in space charge dominated beams, beam dynamics in quasi-isochronous storage rings, and serves as the fundamental principle for beam manipulations. We have introduced and studied the independent component analysis (ICA) data analysis to beam measurements and modeling since 2005.
- Uncover snake resonances (odd-order 1986, even-order 1993). One of spoke persons in the AGS partial snake experiment E880 (1992-2000). Verify the feasibility of using partial snake to overcome imperfection resonances. Proposed rf dipole modulation method to overcome intrinsic spin resonances (Dr. Mei Bai, a Ph.D. student, received outstanding DPB Ph.D. thesis award).
- Carry out analysis for the minimum emittance Triple-Bend Achromat (TBA) lattice. Uncover a necessary condition theorem for a minimum emittance of TBA lattice is that length of the middle dipole in the TBA must be $3^{1/3}$ times longer than that of the outer dipoles in thin lens approximation. In 2006, proposed the concept of quadruple-bend achromat (QBA) lattice, which is superior to double-bend achromat (DBA) lattice for the medium energy (2-4 GeV) high brightness storage rings.
- Carried out space charge analysis for high intensity accelerators, uncovered the main source of emittance growth mechanisms for the Fermilab Booster (PRSTAB 9, 014202, 2006), and found simple scaling laws and fundamental limit of the non-scaling FFAG accelerators (PRL 97, 104801, 2006).

Publications in Books

- S.Y. Lee, *Spin Dynamics and Snakes in Synchrotrons*, (World Scientific Pub. Co., Singapore, 1997); 2nd edition (2005).
- S.Y. Lee, *Accelerator Physics*, (World Scientific Pub. Co., Singapore, 1999)
- S.Y. Lee, ed. *Space Charge Dominated Beams and Applications of High Brightness Beams*, AIP Proceedings No. 377 (1996)
- S.I. Kurokawa, S.Y. Lee, E. Perevedentsev, and S. Turner, eds., *Beam Measurement*, World Scientific, Singapore, 1998).
- S.I. Kurokawa, S.Y. Lee, J. Miles, and E. Perevedentsev, eds., HIGH QUALITY BEAMS: Joint US-CERN-JAPAN-RUSSIA Accelerator School AIP Conference Proceedings **592**, (AIP, New York, 2001).

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3. Hoffman, H.M., Lee, S.Y., Richert, J., Weidenmuller, H.A., Schucan, T.H. *Nonperturbative schemes for the effective interaction in nuclei*. Ann. of Phys. **85**, 410–437 (1974).
4. Hufner, J., Lee, S.Y., Weidenmuller, H.A. *Strangeness analogue states and the spectrum of* ${}^{12}_{\Lambda}$C. Phys. Lett. **49B**, 409–411 (1974).
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